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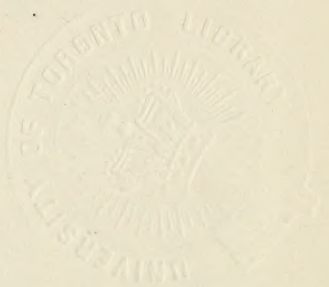
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Vol. 95

JULY—DECEMBER 1915.

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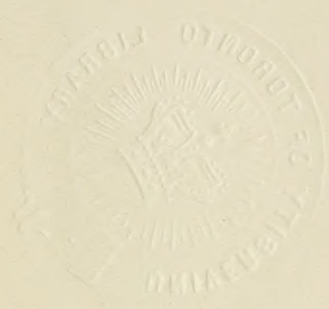
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THE PRACTITIONER.

JULY, 1915.

IMPOTENCE IN MEN.

By WILFRED HARRIS, M.D., F.R.C.P.

Physician to the Hospital for Epilepsy and Paralysis, Maida Vale; Physician to In-patients, Physician to Department for Nervous Diseases, and Lecturer on Neurology, St. Mary's Hospital, etc.

THE causes of impotence in the male sex may be divided broadly into *two* groups. In the *first* group are included all the physical abnormalities which are necessarily associated with impotence or the inability to procreate, such as infantilism, undeveloped sexual organs, undescended testicles, etc. Of these, only the various forms of infantilism need detain us for a moment. Under this title, numerous different varieties of miniature men are described, some of whom may be sexually mature, and may beget children. In the more genuine forms of infantilism, such as the Lorain type and other instances of hypopituitarism, the sex characteristics are undeveloped and immature, though in certain favourable cases treatment by the administration of anterior lobe pituitary extract, or after operation and evacuation of a pituitary cyst, followed by anterior lobe and perhaps thyroid feeding, further development of the sexual organs may result. Cretinism, the result of hypothyroidism, may be included here too, and the good effects of thyroid feeding in this condition, if not delayed until the child is too old, and if the treatment is kept up continually, are well known.

Other causes of impotence, falling in this group, are—chronic diseases of the spinal cord, chronic wasting diseases, such as diabetes, albuminuria, grave anæmia, and the myopathies. Lastly, in this first group as well may be included the effects of the prolonged taking of drugs, such as alcohol, morphine, and cocaine.

It is not every form of wasting disease that, except in the

last stages, is a cause of impotence, as, for instance, in pulmonary tuberculosis fecundity is well known. Of the diseases of the spinal cord, it is particularly those affecting the posterior roots and the posterior columns that give rise to impotence, owing to the anæsthesia of the parts concerned, and the general interruption of sensory impressions from the lower extremities. *Tabes dorsalis* or locomotor ataxy is a well-known example of this form of impotence, beginning with a diminishing intensity of sexual desire and greater difficulty in provoking erection, leading after a few months or more to complete loss of sexual power. Usually this condition, once arrived at, is permanent, though it is not necessarily so, and a tabetic, impotent apparently for seven years, has been known to become the father of a child.

In these cases there is no sterility, but a loss of the reflex vasomotor stimuli which are the basis of the act of erection. Somewhere in the lower cervical and upper dorsal region of the cord is a centre which controls the action of the *nervi erigentes*, which proceed to the corpora cavernosa and spongiosa, from the second and third sacral spinal segments. In disease affecting the lower cervical and upper dorsal region, such as spinal caries causing a partial pressure paraplegia, or in cases of fracture dislocation of the spine, with paralysis of the lower extremities, obstinate priapism is often a very striking feature even though the patient may have no consciousness of the condition, and without any sexual feeling being excited.

Certain drugs, such as cantharides, strychnine, pepper, and other irritants, have the power of exciting this centre, while others, such as alcohol, bromides, and *salix nigra*, exert a contrary depressant action upon it. The treatment of the spinal disease giving rise to impotence must be directed to the general cure of the disease itself, and is often extremely difficult.

In cases of *tabes dorsalis* in which the symptoms are progressing, if the age is not above 60, and particularly if the Wassermann reaction in the cerebro-spinal fluid is positive, with an exaggerated lymphocyte count and presence of the globulin reaction, much good may be obtained by energetic anti-syphilitic treatment, such as intravenous salvarsan, or the English equivalent kharsivan, which I have found equally

efficacious in its action and quite as safe in its effects, combined with daily mercurial inunctions.

Salvarsanized auto-serum I consider to be most valuable in combating and arresting the symptoms of the disease, causing a greater improvement in the general condition than any other form of treatment. In this treatment, after giving the intravenous dose of .6 grm. of salvarsan, I draw 14 days later six to seven ounces of blood from the arm by means of a needle, and allow it to clot in a sterilized flask, taking care that it is not moved for 15 hours. Then I decant off the clear serum, and with full aseptic precautions inject from 40 to 50 c.c. of the serum intrathecally, after draining off somewhat less than this amount of cerebro-spinal fluid by means of lumbar puncture. I find it far better to wait a fortnight before withdrawing the blood for little or no good effect is produced if the blood is withdrawn an hour after the intravenous injection of the salvarsan, as originally advised by Swift and Ellis.

Impotence acquired as a result of the long continued taking of drugs, such as alcohol, morphine, or cocaine, may be recovered from after cessation of the habit combined with general tonic treatment. Very often the taking of these drugs is but a symptom of a type of mental degeneracy, when the arrest of the habit will be found much more difficult, if not impossible of attainment.

Azoospermia or absence of living spermatozoa in the semen, may be either a congenital cause of impotence, or it may appear as an acquired condition. It has been ascribed in certain cases to prostatorrhœa, the deficiency in the normal secretion of the prostate causing premature death of the spermatozoa. Another cause of azoospermia is the long continued exposure of the reproductive organs to minute doses of X-rays, or to a few heavy doses of the same treatment. In order to protect themselves against this destructive effect upon the testicular secretion, radiographers and other workers in X-rays have adopted various devices, such as the wearing of heavy aprons of rubber impregnated with lead, though the modern method of protecting the X-ray tube in a lead-lined box, and of allowing the X-rays to escape only in certain specified directions through windows, has generally replaced the rubber aprons. Yet in spite of

these precautions, it is a well-known fact that children are a rarity amongst specialists in radiography, probably owing to the leakage of X-rays, in spite of the greater protection given to the tube than formerly. With the heavy output of the more modern tubes, such as the Coolidge, the difficulty of escaping the effect of chronic dosing with X-rays by those who work constantly with this agent, will undoubtedly become greater.

Azoospermia is not to be confounded with impotence, in which the man has an inability to produce the erection necessary for coitus. The sexual desire may remain quite normal, and normal coitus with ejaculation of fluid semen occurs, though no living spermatozoa are present. This form of impotence cannot of course be claimed as a ground for a nullity suit, in order to declare a marriage null and void.

The *second* group of causes of impotence in the male includes various forms of congenital mental abnormalities, such as the neurasthenic and the psychasthenic, congenital frigidity, the sexual invert, fetishism, masochism, and sadism. Excessive masturbation may lead to impotence, either through the development of neurasthenia and the inability to produce the necessary erection, or through premature ejaculation of semen before erection is fully produced. Spermatorrhœa is another form of chronic disorder which may result from excessive masturbation, semen being ejaculated during the day as well as during sleep. These pollutions may occur during defaecation or after passing urine, usually without any erection being produced, though a slight sexual feeling and orgasm may accompany the act. The repeated occurrence of these pollutions is very apt to engender grave neurasthenia, or to aggravate a pre-existing neurasthenic or psychasthenic state. Neurasthenia, or some form of neurosis or insanity, is almost constantly present in the family history of such sufferers, and thus the one condition engenders the other, and a vicious circle of sexual neurasthenia is established.

Masturbation is by no means a necessary preliminary for the development of sexual neurasthenia, though it is often given far too prominent a place in the thoughts of the patient. Shyness and shame of the degraded state, to which they consider their own acts have brought them, are often

exaggerated intensely by the reading of pernicious literature of the type of "What every Young Man ought to know," in which quack nostrums are advertised by playing on the secret thoughts and acts of the youth. In the treatment of such cases, a straightforward discussion of the symptoms is the first thing to be done, followed by healthy advice as to the restraining of the act of self-abuse, and indeed for a time the advisability of putting aside all thoughts of sexual excitement. For a few weeks a dose of twenty grains of sodium bromide, morning and evening, with a healthy outdoor life, early hours, light bed-clothes, tepid baths, and abstinence from all alcoholic drinks, will prepare the way for further treatment, should it prove necessary. This treatment will usually bring about diminution or cessation of the pollutions; strychnine may then be substituted for the bromide, and attempts at a resumption of a normal sexual life may again be made.

More difficult often to treat are those cases of hereditary neurasthenia in whom the sexual instinct is not strong. Such men usually marry late if they marry at all, and have neither masturbated to excess nor gone with women. Usually, indeed, such a man has never had sexual intercourse with a woman, but may have lived a fairly untroubled life, and have achieved fair success in business or in a profession before marriage. Untutored in the necessary procedure, because of his inexperience and previous weak sexual instincts, he finds himself unable to perform coitus, partly owing to intense nervousness and partly to insufficient erection. Nightly failures make matters worse, and mental depression and hypochondriasis result, which are very liable to end in a sudden uncontrollable impulse of self-destruction.

These cases want very delicate handling, because even though the worst result, suicide, may not take place, yet the repeated failures at performing coitus may produce such a depressing effect upon a man of hereditary unbalanced temperament, that a negative state of fetishism may be set up, so that he has henceforth far less sense of sexual attraction towards his wife than he has towards another woman. Not infrequently such marriages are subsequently dissolved by a nullity suit being brought by the wife. In the treatment of such a case, the first necessity is to insist on separate

bedrooms for at least a fortnight, no attempt at coitus or sexual familiarity being made during that time. This alone may be sufficient to put matters right, by giving the initial nervousness and strangeness of married life time to wear off. In the more aggravated cases of neurasthenia this alone will fail, and hypnotism or treatment by psychoanalysis and suggestion may bring success. Sometimes it is advisable to bring the wife into the consultation, and invoke her aid in the mechanical performance of the marital act.

Congenital frigidity of temperament, although present to a certain degree in the class of case just discussed, may yet exist alone without any neurasthenic symptoms. Such sexual frigidity varies in degree from total absence of sexual feeling and consequent impotence, which appears to have been the case in the historical example of Michaelangelo, or it may be partial only, the sexual appetite being slight, and coitus possible not oftener than once a fortnight or even once a month. Such weakness of sexual feeling is not dependent on feeble build and smallness of stature, and has frequently been observed in powerful athletic men, such as University Blues. Indeed, a frequency of coitus, which in one man may almost amount to continence and require moral restraint on his part, may, in another man, be a great excess, causing in him headaches, backache, and great enfeeblement of mental and bodily vigour.

There is little to be done in the treatment of congenital frigidity amounting to impotence, nor, as a rule, do they often call for treatment, except in those cases in which it may be considered highly desirable that an heir may be obtained for an estate or title. Usually marriages of such men turn out childless, though not necessarily unhappy, unless the wife happens to have an unusually ardent temperament. Messalinas are, however, fortunately rare.

Frigidity in the male may be acquired, without neurasthenia as a cause, in married men who for some reason have developed a sexual aversion to the wife. Usually in such cases there has been some form of obvious incompatibility of age. If the woman is much the older, the man is probably sexually somewhat frigid to begin with, and in addition his desire for the woman has been dulled or killed by disillusionment. Some-

thing in her personal appearance when undressed, false teeth, bad-smelling breath, and a host of similar details may combine to produce a state of impotence for the particular marriage. The man may not be aware of the cause of his apparent loss of sexual power, and as he is usually accompanied by his wife when seeking advice, some tact is necessary to discover the source of the trouble. Close cross-questioning when alone will be necessary, and the method of psychanalysis may be invoked to fix the responsibility. The discovery of the cause may be sufficient to indicate the cure, and it will be wise to advise him to use a separate dressing-room, and never to invade the bedroom while his wife is dressing.

More usually, the disparity in age is on the other side, and impotence may be complained of when a man of over forty marries a woman more than twenty years his junior. Very probably he has practised sexual excess in former years, and after some years of comparative continence, his fresh marriage in late middle life breaks down his sexual powers, and after a few weeks of frequent intercourse, which would have been normal in his early youth, he finds his power of producing an erection becomes increasingly difficult, until he is totally unable to attempt coitus. An over-ardent temperament in the wife will increase his difficulty instead of helping him, and total abstinence from the marital act is necessary for him for a time.

The treatment of this condition is comparatively simple, for the impotence is temporary in the majority of cases, and does not depend on some abnormal physical or psychical state of the individual. As already stated, separate rooms for a few weeks are advisable, and often nothing more may be necessary, matters automatically adjusting themselves. Avoidance of alcoholic drinks, moderate outdoor exercise, and early hours will help the return of the sexual power. General massage and faradism of the thighs, nates, and perineum, with small doses of strychnine may be necessary in the more obstinate cases, though stimulation by drugs is, as a rule, not to be recommended, unless coitus is greatly desired for the purpose of getting a child. Tincture of cantharides may be given in 5-minim doses, in combination with 5-minim doses of 1'q. strychnin., and two minims of

tincture of capsicum. Perineal sprays and douches are used as well for this purpose.

Frigidity in the wife is alone not a cause of impotence in the male, though if he is of neurasthenic stock and highly susceptible or imaginative, complete frigidity in the female, though not accompanied by any open expression of reluctance or disgust, may induce gradually a corresponding reluctance on the man's part, until he is no longer able to attempt the act with his wife. This is not true impotence, for under congenial conditions his virility will be found to be normal. There is no treatment which can change this condition, and the man has to choose between continence and developing an outflow for his energies elsewhere.

A not uncommon form of sexual trouble, affecting males particularly, is known as *fetishism*. By this is meant that before the man is able to produce an erection and arouse his sexual appetite, certain conditions, varying with each individual, must be satisfied. Thus, for example, one man will not be able to perform coitus unless the woman is dressed in black stockings, with her shoes off, and lying on the hearth-rug. Another will be unable to carry out the act at home, but finds the necessary suggestiveness in an hotel bedroom, or when staying away with friends.

Such difficulties may be traceable to an examination of the conditions present when the patient first experienced connection with a woman, and the sub-conscious impressions made at the time in association with the act, like the keyword of a letter padlock, require to be reproduced before the necessary sexual excitement as the preliminary to coitus can be developed. Fetishism is a prominent symptom of a class of sexual inverters who take no pleasure in actual coitus, but whose sexual appetite is excited and satisfied by certain acts performed by women in their presence. With some men, this takes the form of requiring to see the woman urinate or defecate, while another may derive apparent pleasure from holding a woman's boots, or holding her in a sitting posture in his lap. This form of sexual inversion is but in degree removed from that form known as *masochism*, in which the man derives sexual excitement and pleasure by enduring passive pain and torture. Thus, one man must walk barefoot

on sharp stones at night, before his sexual appetite is sufficiently whetted to enable him to perform coitus.

A frequent form of this type of sexual inversion requires *flagellation* as the sexual incentive, and it may be the only form of sexual pleasure in certain men to be birched across the nates by a woman, coitus never being performed at all. Another man pays women to trample with their shoes upon his chest and face. Closely allied to this form of sexual inversion is that known as *sadism*, in which instead of the man enduring passively pain and acute discomfort as his particular form of sexual pleasure and excitement, he satiates his lust by inflicting injuries upon the female. This may be by birching or other forms of active flagellation, or in certain instances savage injuries are inflicted in this way. This tendency is a reversion to a primitive savage instinct to hurt the female during courtship, which is seen in some animals and in some savage tribes, as the Esquimaux. The famous Whitechapel murders by "Jack-the-Ripper" were no doubt extreme instances of sadism.

Another form of sexual inversion shows itself in an inborn tendency to *homosexuality*. This is to be distinguished from the homosexuality of environment, as practised in schools, prisons, among tramps, etc., where the vice is due to lack of normal sexual opportunities rather than to sexual perversion. With others again, masturbation is preferred to normal sexual intercourse.

All these forms of sexual inversion are causes of impotence in performing the normal act of coitus, and are due to psychological abnormalities indicative of a neuropathic strain of heredity. All forms of insanity and other neuroses are likely to be met with in such families, and the patient himself frequently breaks down mentally, and may require certification. The treatment of these psychasthenics is difficult and not over hopeful. Something may be attempted by psychoanalysis, and if it can be shown that the sexual inversion and consequent impotence is due to a definite psychical trauma in the past history, the very fact of its discussion during psychoanalysis may be sufficient to dissipate its influence, and allow of a return to more normal sexual habits.

STERILITY IN WOMEN—A SURVEY.

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THE study of the ætiology, consequences, and treatment of sterility involves not alone an accurate knowledge of the sexual defects in both sexes that may contribute to it, but demands as well a wide acquaintance with gynæcological affections and their treatment, while taking us into the field of psychology and disorders of mentalization. The influence on the man, if he realizes that he is the primary cause of the sterility, often makes him self-reproachful, despondent, and gloomy. This attitude, when allied to a manifest disappointment on the wife's part, leads to unhappiness in the home, and constraint in the marital relations. With the woman, the influences that operate are still more diverse and serious. She may be the subject of congenital abnormalities in the genitalia, which in themselves are frequently present with aberrant mental states, or the victim of dysmenorrhœa, or other fault of menstruation. More or less enfeebled in mind and body before marriage, she is ill-fitted to bear any mental burden or disappointment. Should there be added to this any active disease in the genitalia, or should she realize that her childless state is due to some flaw in her sexual organs, the mental unrest may give us the fatigued neurasthenic or the obsessed psychasthenic.

Such patients not infrequently come for medical advice or some of those legions of symptoms to which the pronounced neurasthenic is a prey, and not for the sterility. It is only when we inquire into her menstrual and marital history, that we discover how disordered sexual impulses are the active causes of the various neuroses to which she is subject. We have then to travel far outside the narrow field of anomalies in the generative organs of either sex in our

wider view of this subject, in its bearings on the health of both husband and wife. Indeed, in a number of cases we have to go carefully into the general health of both, and ascertain that there is no organic mischief, circulatory or nervous, which may throw a light on the inability of the man to perform or the woman to respond to the marital act.

It is obvious that when a practitioner is consulted by a woman for sterility, he has to exercise considerable caution and care in diagnosis, and perhaps in treatment. It is typically a condition in which the conclusion he arrives at depends on a clear and definite knowledge of its cause, and since it is one which must occasionally occur in his practice, his method of dealing with it may have a considerable influence on his reputation.

It is not possible in the space of a comparatively short article to enter minutely into all the points that have a bearing on the presence of sterility, whether the cause be in the male or female. One must be content to deal in a general manner with the practical facts that must be kept always before us, if a reasonable time of matrimonial life has expired without conception, or that through abortions or miscarriages the woman's fecundity ceases, and she is childless. The history of the researches into the causation of sterility is a lengthy one, from the time when Marion Sims exhaustively investigated the cervical mucus and the spermatozoa contained in it immediately after intercourse, and first brought about impregnation by intra-uterine injections of the seminal fluid, to more recent years. Our American confrères have been in the van of such later investigations. Perhaps the most important of the earlier researches were those of Matthews Duncan, in regard to the social and economic causes that tend to reduce the birthrate; those of Gross (S. Gross, 3rd edition, 1887) into the causes of male impotence, and the influence of age on fecundity; Jacobson's masterly summary of these causes; and Engelmann's investigations into the decreasing birthrate in American and Canadian women. (Engelmann *Jr. Amer. Med. Assoc.*, October 5th, 1901.) The potent factors that fix the responsibility on the male parent have been fully recorded by Finger, F. Kehrler, Lier and Asch in Prochownik's clinic, and others. Howard Kelly has dealt with the ætiology of the entire subject, including various statistical records from both the male and

female sides of the question in his *Medical Gynæcology* (1909). Previously, E. Henrich Kisch wrote important papers (1889 and 1895) on the ætiology and prophylaxis of sterility. (Also Kisch, E. H., *Die Sterilität des Weibes. Zweite Auflage*, 5, 1895.) Of recent contributions, some of the most important are those of Hunter in the *American Journal of Surgery*, 1912; Scholtz (*Arch. f. Dermatologie u. Syphil.*, 1810, p. 101); Frederick Holden on the Dudley-Reynolds operation (*American Journal of Obstetrics*, July-December, 1913, p. 1064); Hühner (*American Journal of Surgery*, April, 1912); Max Hunter—New York—on Sterility in the Male and Female (*Medical Record*, May 1914); Ferdinand Kehrer, the Surgery of Sterility (*Münch. med. Wochensch.*, November 12th, 1912); Edward Reynolds (*Journal of the American Medical Association*, October 11th, 1913, and the *New York State Journal of Medicine*, January 1914); W. Barney (*Boston Medical and Surgical Journal*, June 1914, p. 943). "*Sterility in the Male and Female, and its treatment*" (Max Hühner, New York, 1913).

Some questions connected with fertility have only to be mentioned to compel the realization of their vital bearing on the well-being of a nation. There are associated attendants on the decline of a population, which are disastrous alike to the physical and moral fibre of any people desiring to maintain its position in the competition and rivalry of nations. These are, the resort to artificial means to prevent conception, with which frequently comes deterioration of health in the man, and more commonly still, both general ill-health and local affections of the generative organs in the woman. As such practices are more frequently resorted to in the upper and better nourished classes, the proportion of children born in the poorer and struggling ranks of life is necessarily greater, and in consequence a relatively larger number of weak offspring are born unfit for the struggle of existence. If they survive, they become a future burden on the State.

The knowledge of preventive measures, however, has spread in recent years in the poorer populations of the large cities, and the efforts to prevent conception, or bring about abortion, are much more general than they were.

When advice is sought for primary sterility, unless there

be conclusive evidence of the impossibility, through some congenital error in the genitalia, the responsibility of the male parent for the fault has to be remembered. The statistics published by a number of authorities on this point vary so widely, that no accurate conclusion can be arrived at. They prove, however, that in such a considerable proportion is sterility to be traced to the husband, that inquiry as to his sexual health is imperative. On the wife's side, if it be only an apparent hindrance, through some abnormality of the introitus, shortening of the vaginal canal, abnormality of the portio and os, or any evidence of a chronic inflammatory condition of the vagina or uterus, or premature escape of the seminal flow, the spermatozoa must be examined, and the husband's share in the responsibility fixed. In such inquiry, it is necessary that delicacy, tact, and judgement should be exercised, while opportunity is made for questioning or examining the husband without raising the wife's suspicion. We have to ascertain that there is no contributory fault in the act of cohabitation, no congenital or acquired flaw, or malformation of the penis; no consequences of previous gonorrhœal inflammation, or, possibly, actual impotence. Without healthy spermatozoa, conception cannot occur, and when there is ground for doubt, the seminal fluid should be examined.

In some instances, we arrive immediately at the cause in the female genitalia, by finding that the hymeneal orifice is contracted, and the hymen intact. In two instances, I have known marital intercourse carried on for several years—in one for over ten—without penetration. In both, within a period of two years, a living child was born after the removal of the obstructing hymen and full dilatation of the vaginal canal. In one of these cases (Author's *Diseases of Women*, 9th ed., vol. II., p. 991) I was consulted, not for sterility, but for symptoms of appendicitis. On making an examination I discovered an almost closed introitus. There was a large cystic ovary, and a diseased appendix, which I subsequently removed. It must not, however, be forgotten, that with an unruptured hymen and a very small orifice fecundation may still occur.

It may be well here to interpolate the facts which should be ascertained on examination of the woman or her husband,

which are essential to a correct diagnosis. The employment of an anæsthetic is often necessary, before we can arrive at a satisfactory conclusion. Hyper-sensitiveness and neurosis are frequently present, making this imperative. In inquiring into the woman's history, we ascertain the nature of her employment, and if there has been mental strain previous to marriage. Pressure of hard study amongst women who go in for higher education, collegiate courses, university graduation, and examinations, is unfavourable to conception. This is more generally the case, since women have been employed in occupations demanding far greater mental and physical strain than formerly. We ascertain the character in regularity, quantity ; the nature of the catamenial flow before and after marriage, as well as the condition of her general health, and if there has been ante-marital treatment of the genitalia.

It is well to recollect that statistics prove that, in the great majority of healthy marriages, conception occurs before the termination of the first sixteen months of married life, or at least before the end of the second year. Further, that up to the end of the fourth year, we cannot fairly assume that there is sufficient ground to regard the case as one of sterility. From this time forward, the proportion of sterile women increases with the years of married life. There is that special class of case in which marriage has been followed by early conception, but fecundity ceases, owing either to some constitutional deterioration in health, or such a local cause as the development of a uterine growth, a displacement, a gonorrheal infection, or an acquired impediment to the passage of the semen in any part of the genitalia.

In examination of the introitus, we note the position of the vaginal orifice, if projected too far forwards from abnormal pelvic obliquity ; the position of the clitoris, if out of reach of contact during coitus ; if there be any enlargement of Bartholin's or Skene's gland. Extreme sensitiveness or pain on touch is associated with the spasm of vaginismus, a slight fissure at the fourchette, or an ulcer at the margin of the hymen. Passing to the vagina, we may find it short and contracted, a stricture of the canal, the cervix bathed in discharge, or a general inflammatory and granular state of its walls. In all cases the dorsal position and the use

of a duckbill or expanding speculum, are necessary.

In examining the uterus, we note a short, conoidal, elongated, or absent cervix ; the size of the os, or its partial or complete closure, and the length and patency of the uterine canal. We may find stenosis of the isthmus, and the existence of a myomatous, polypoid, or other tumour. The nature of any uterine discharge is afterwards determined by careful examination in the laboratory. A chronic endometritis is not an unusual cause of sterility, and I have known a woman immediately conceive after five years of sterile married life on its cure. The position of the uterus, and the presence of an acute anteversion with flexion or retro-flexion, is ascertained. Enlargement of the ovary from any cause, or its prolapse, a parovarian cyst, and actual dilatation or a swelling of the tube, are easily detected. But, obviously, some tubal anomalies, such as elongation, interstitial changes leading to stenosis, torsion causing blockage, and adhesions, are often not possible of detection.

We must regard gonorrhœa as one of the principal causes of sterility in both sexes. In the male, there are the secondary consequences, through the involvement of the seminal vesicles, orchitis, prostatitis, epididymitis, both unilateral and bilateral. Martin's ingenious operation of joining the vas deferens to a healthy portion of the epididymis is meant to rectify this latter condition. In a limited number of cases, as, for instance, in an old chronic epididymitis, it may be necessary to aspirate the testicles in order to ascertain whether any spermatozoa are secreted or not. If none are found, the case may be looked upon as practically hopeless. It is a step which is not to be taken without due deliberation, and must be conducted with the greatest care. This applies not only to the method of preparing and inserting the aspirating needle, but also to its withdrawal and the further examination. Should there be nothing but serum found, the operation of epididymo-vasostomy would obviously be useless. Apart from the occurrence of stricture, the frequency with which the sequelæ of gonorrhœa occur justify this conclusion.

In the woman, once the presence of the gonococcus is established, the inquiry into the extent of the affection and consequent treatment must be thorough and active. The fatal

facility with which the adnexa are invaded, even before the woman is forced to seek advice, is well known. If the vagina and cervix appear to be alone affected, these have to be dealt with at once in one of the several methods adopted for destroying the gonococcus, and restoring the vulva, including Skene's and Bartholin's glands, to a healthy condition. The greatest care has to be taken that neither by the sound nor carrier is the infection conveyed to the fundus. When the cervical canal has been thoroughly disinfected by such means as the application of nitric acid, 5 per cent. solution of nitrate of silver, or the cautery, a Playfair's probe tightly armed with cotton wool is carried into the cavity of the fundus, and any discharge collected on it is carefully examined for the gonococcus. A fine suction syringe may be used for the same purpose.

If it be found, then the entire canal must be treated. For the vagina, I have had the most satisfactory results with nitrate of silver and collosol silver applications, followed by glycerine and ichthyol or "merlusan" tampons; when the fundus is invaded, it is well to dilate the uterus moderately before making any application. I have found nitrate of silver in the first instance, followed by iodine and ichthyol in subsequent dressings, quite efficient. Should the disease have gone further, and the adnexa be affected, then the case is one for cœliotomy and exploration.

It must be remembered in discussing more recent operative procedures for the relief of dysmenorrhœa and sterility, caused by congenital stenosis and antelexion, that so far back as 1893, Pozzi of Paris devised his operation, having the same object in view as Dudley, viz., free access to a patent uterine canal, with relief of the flexion (*Bull. et Mém. de la Soc. de Chir.* 1893, 1, 19, p. 93). It is fully described in the 4th edition of his treatise (vol. 1, p. 497). Pozzi, however, divided the entire cervix bilaterally, so as to form two surfaces above and below the isthmus. The uterus is then curetted. The retracted halves of the cervix are marked out into four triangular spaces, from each of which a prismatic portion of the cervix is taken, two above and two below the level of the os. The internal line of each excised portion is parallel with the cervical endometrium, the external border with the vaginal mucous membrane. When these excised portions are

sutured, a large duck-billed shaped opening is left, which gradually contracts. Pozzi and other French writers claim considerable success from this operation, which has been followed by pregnancy without any difficulty in parturition, as also by cure of the dysmenorrhœa.

A perfect *résumé* of the technique of the Dudley-Reynolds operation of antelexion of the uterine canal for the cure of dysmenorrhœa and sterility, with illustrations showing the steps of the operation, is to be found in the communication by Frederic Holden in the *American Journal of Obstetrics*, vol. 68, 1913. He shows how Marion Sims and Skene were among the Edisons of Gynæcology, yet we cannot forget all we owe to men like Ephraim McDowell, the originator of ovariectomy, Emmett, R. Battey, Galliard Thomas, Fordyce Barker, Weir Mitchell, and others.

The principle of the Dudley operation is to give free access to the fundus of the uterus by establishing a permanently patent uterine canal. Briefly the operation consists of these steps :—

- (a) Free dilatation and curettage of the uterine canal.
- (b) Incision of the posterior lip up to and including the internal os, the incision being carried posteriorly to the utero-vaginal junction.
- (c) Removal of the V-shaped piece of tissue from each side of this incision.
- (d) Careful and complete adaptation by sutures of the cut surfaces.

The principle of the Reynolds operation is to bring the os uteri into a normal position for the reception of the semen in a case of exaggerated antelexion. This is effected by securing a longer anterior vaginal wall, at the same time that the posterior cervical lip is shortened, and the uterine canal is straightened. The steps are simple. The anterior lip of the cervix being thoroughly retracted, and the anterior wall of the vagina well exposed, a transverse incision is carried horizontally for an inch and a half across the vagina, below the utero-vesical junction. The intervening tissue is carefully separated and pushed up with the bladder. By traction with Kelly's hooks, at the upper and lower medium point, the

incision is converted into a longitudinal one, which is then carefully sutured. The operation has the advantage over the Dudley operation alone, that any tendency to flexion of the anterior wall that may result from the latter step is avoided.

When we turn to the sources of sterility in the male, it has primarily to be borne in mind that impotence here is consistent with apparently normal cohabitation. The perfectly healthy act, with strong sexual desire, may be present, and yet the woman be sterile, the fault lying in the virility of the spermatozoa, which are incapable of fertilizing. Here the defect is very liable to be attributed to the woman, and this, with the absence of conception, has a deleterious effect on her health and sexual organs, leading possibly to an affection of the latter. A woman who apparently has had normal marital relations with her first husband, and still has never conceived, does often have children by the second.

Having inquired into the state of the husband's health generally, we exclude absolute impotence from want of power, and congenital or acquired abnormality in the penis and testicles; the consequences of syphilis or gonorrhœa, or any obstruction, such as tight prepuce, stricture, or prostatic enlargement. If there be no living spermatozoa found in the seminal fluid, it is a case of *azoospermia*; while if but few living elements are present, or none at all are found, it is a case of *oligospermia*. If dead or unhealthy and feeble ones are found, *necrospermia* is the term applied.

With regard to the vitality of spermatozoa, the living ones have the tail straight, while, if it be curled up, they have come out dead. Hühner remarks that motility does not exist in the tail alone, but that the head is also motile, and capable of independent movements which often survive those of the tail.

There may be psychical sources of the sterility, such as nervous apprehension, physical repulsion, and want of affinity on either side. We ascertain if the coitus be normal in regard to erection, sensation, the time it lasts, ejaculation of the semen, or if the act be painful. We seek for atonic causes in masturbation, venereal excess, and the use of drugs, alcoholism, and tobacco. Some of these conditions we find not infrequently in the husband co-existing with the sterility. They are present in such enfeebling diseases as diabetes, phthisis,

affections of the spinal cord, all leading to loss of sexual power, and mental depression consequent upon the inability to carry out and complete the act. There is the failure that results from syphilis, in any of its many "reminders," resulting in some serious systemic or local affection; gonorrhœa, causing urethral obstruction and difficulty in erection, as well as the diseases of the female genitalia consequent upon infection. Apart from such hindrances, there is the deliberate withdrawal before ejaculation.

I have said sufficient to establish these conclusions before any line of treatment of the woman is determined upon.

(1) We are not hurriedly to conclude that, apart from an obvious congenital abnormality, some defect or affection of the genitalia is in itself sufficient to explain the sterility. I have known a woman with typical short conical cervix and pinhole os uteri conceive, and have recorded a case of early pregnancy in which I operated for pelvic perimetritis where the uterine discharge was loaded with gonococcus. I found a distended tube discharging into the peritoneal cavity. Impregnation may occur with endometritis, and diseased conditions of the adnexa, as well as with any form of version or flexion, provided there be not such complete closure of the canal as to prevent the possible entrance of the spermatozoa. In any doubtful case, before we decide on operation, we have to examine the seminal fluid. An able paper by Max Hühner in the *Urologio and Cutaneous Review*, of November, 1914, appears on the subject, and should be read in its entirety. It deals with the value of the spermatozoa test in definitely fixing the responsibility on the husband or wife. The test involves (a) examination of the cervical mucus for the presence of healthy spermatozoa as soon after coition as possible. If these be found, the author argues that it disposes of most other sources of male sterility, for such spermatozoa, found both in the male and female, negative any assumption that the defects I have enumerated in the husband can be the cause of the sterility; it shows too that the vaginal and cervical secretions play no part in its causation.

Hühner gives explicit instructions for examining for spermatozoa from the fundus. The cervical mucus must first be examined; then there has to be most careful cleansing of the

cervical canal. Throughout the whole examination perfect asepsis must be maintained. The examination has to be made on the spot. He uses either a wooden applicator or a special syringe for the fundus uteri. The greatest gentleness has to be exercised, so as to avoid any bleeding. If a platinum loop be used, it has to be occasionally sterilized.

Hühner objects to the use of cotton for wipes, as the fibres are apt to stick to the parts and get mixed up with the specimen. The microscopic examinations have to be conducted with extreme care, and it is desirable always to use a cover-glass over the specimen.

(2) If the spermatozoa found in the cervix are dead, then he obtains a *condom* specimen. Here the semen is ejaculated into the beater's skin cap that covers the penis. This decides if they have been alive or were killed in the passage to the uterus. If they be living, healthy spermatozoa, the fault cannot be with the husband. It may then be attributable to some quality of the cervical or vaginal mucus. If before the next coitus a vaginal alkaline douche be used, and the spermatozoa are now found alive and healthy, the hyper-acidity of the vaginal secretion is established as being the destructive agent. A pre-coital alkaline douche, Hühner says, will in such a case frequently effect a cure; whereas if it be a failure, then we must adopt other means to secure a healthy vagina, and deal with the endometrium by uterine applications or curettage. Still, if there be premature ejaculations and hypospadias, a bad case of stricture of the urethra, or other physical or nervous condition from which the husband suffers, which interfere with the arrival of healthy spermatozoa in the cervix, even though such be found in the *condom* specimen, the woman remains sterile.

Hühner even goes further, and, when necessary, with a special syringe extracts after coitus some of the mucus from the cavity of the fundus. If there be living spermatozoa found, the cause cannot be due to any flexion or affection of the endometrium, and so we may conclude that either the uterus is unable to support a healthy ovum, or that the fault is higher up in the adnexa. This conclusion is verified by the exclusion of any other uterine condition which would prevent impregnation. There are other matters in Hühner's communication which are worthy of note, but these are the principal points that

touch the object of this paper,

In his work on *Sterility in the Male and Female* (1913), he lays special emphasis on the following points: there is a loss of motility in the spermatozoa 15 minutes after coitus, and as a rule, after an interval of an hour they are dead. Acidity of the vagina is the cause. Haussmann's experiments (Haussmann, *Ueber das Verhalten der Samenfaden in den Geschlechtsorgan des Weibes*, Berlin, 1879) confirm this effect of the acid vaginal secretion. Live spermatozoa, according to this author, are never found 12 hours after coitus. If menstruation occurs, they may be extruded at that time from the uterus. There can be no doubt, also, that uterine secretions are often destructive of spermatozoa. Hence the great advantage of curettage if there be any unhealthy uterine discharge, the result of chronic endometritis.

Hühner does not agree altogether with Runge's conclusions (Runge, Ernest, *Archiv. für Gynäkologie*, Band. LXXXVII., 1909) with regard to effluvium seminis, and from the former's cases it would appear that in a large proportion in which this fault on the part of the husband was complained of by the wife, there were present abnormalities in her genitalia, while Hühner, by careful examinations, found live spermatozoa in them on several occasions.

From the facts I have summarized, it is obvious that any jumping to conclusions from the presence of some abnormality in the female genitalia as the cause of sterility is wrong. Before we subject the woman to any operative interference, the possibility of the husband's share in the trouble must be put beyond question. At the same time when, from the degree of abnormality, there is an obvious reason why the woman does not conceive, whether the husband be at fault or not, it is our duty to rectify this, while at the same time we inquire into the husband's virility. The rectification of any obstacles on the wife's part will be futile, if some defect on his remains unattended to. There can be no doubt that the combined Dudley-Reynolds operation in those cases in which it is indicated is the most complete in its technique and result of any.

We must not, however, overlook the fact that simpler steps, such as free division of the cervix and isthmus, aided by curettage when necessary, and full dilatation of the canal maintained for some time, will often be sufficient to ensure

success, and be quickly followed by conception. One important precaution that should be taken in any such operation on the cervix is the closure of the incision so as to prevent future gaping or erosion. It has also to be borne in mind that success does not always immediately follow any operative measure. I have known this occur on many occasions, even when I have thought interference had been useless.

Some years back, I operated on a woman for a large vaginal prolapse with cystocele, doing an anterior and posterior colporrhaphy. She had been married for some years, and had not conceived. I was recently told by her doctor that a few years after the operation he had attended her in two confinements. In a case in which there was incontinence of urine from a completely anteverted uterus, and any relief from a pessary or vaginal operation was hopeless, I ventro-suspended the uterus. The patient had several pregnancies after this.

In regard to the prognosis, the most prudent course to pursue is not to give any assurance of a successful issue from operative or other treatment. There is the class of case in which the symptoms, or some affection present in the genitalia, demand interference, and where, quite independently of the question of conception, operation is imperatively called for. There is the other class, in which the general health of the woman is in no wise affected, and in which we interfere for the cure of the sterility alone. In neither do we make a definite promise of a successful issue. We explain the probable cause of the sterility, and if it be one calling for operation we can assure the woman that the cure of the disease from which she suffers may be followed by conception, or that remedying the genital abnormality is frequently successful in bringing it about.

There is a final caution which it is well not to omit in regard to all operative measures undertaken for the cure of sterility. No matter how slight, they have to be carried out with all the precaution that modern asepsis demands, both in the previous preparation of the patient and the details of the technique, as well as in the subsequent treatment. This caution is the more necessary when we remember that apparently trifling operative measures on the uterus may rouse some old dormant adnexal mischief into activity, and compel resort to more serious operative steps than were anticipated.

THE MEDICO-LEGAL ASPECTS OF IMPOTENCY IN THE SEXES.

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IMPOTENCY in the sexes may be considered from different points of view, but the purpose of this communication is to deal solely with its medico-legal aspects.

Relative to the male sex, the question as to the existence of impotency is only likely to arise in the Courts, (1) when the paternity of an infant is disputed on the ground of age or impotency of the reputed father, (2) in actions of declarator of nullity of marriage, or (3) in certain rare instances of alleged rape, in which by reason of age the assailant is alleged to be sexually impotent.

In the first class of case, and apart merely from age, the existence of certain bodily infirmities may compel the question of the existence of impotency to be raised, as, for example, in cases of hemiplegia, paraplegia, and locomotor ataxia. But even in such cases the potency or impotency can only be decided by examination of the particular case, for no general rule with reference to these can be laid down.

Most usually, however, the investigation as to impotency arises when it is believed that some physical defect, deformity, or malformation of the external genitals exists, and that an examination will probably reveal the presence or absence of any such defect or deformity. In the case of the female, the question of impotency has been confused by discussion of the question of sterility as part of the former and larger subject. But we have no concern here with the subject of sterility, as applied to the inaptitude of the female for impregnation or her inability to procreate children. That is purely a medical matter, and under usual circumstances does not involve any medico-legal issue of the kind now under discussion. From the legal point of view, impotency in the female must be looked

upon as any physical and irremediable conformation of the sexual apparatus, which prevents the act of coitus. Here it will be of some importance in the development of the subject to consider what marriage is legally.

By the law of England marriage is both a religious or ecclesiastical, and a civil contract. By the law of Scotland, it is solely a civil contract. It is a maxim of the law of Scotland that *consensus non concubitus facit matrimonium*. The contract between two persons of opposite sex is, *inter alia*, one which presupposes on the part of each the lawful use of the body of the other ; or in plainer words, the capability of each for the share-fulfilment of the act of physical union. This general proposition, however, must be qualified to the extent that, if one of the spouses enters into the contract knowing that the other spouse is so disqualified, he or she could not after the marriage raise an action of declarator of nullity of the marriage against the other, seeing there had been no fraud in the fulfilment of the contract. In the general sense, therefore, any cause whatever originating and continuing on the part of either of the spouses which has created and establishes a barrier to coitus would, according to the law of contract, enable an action of declarator of nullity to lie, in respect that the marriage had not been and could not be consummated.

It will probably be sufficient to cite on this point Blackstone, who puts the matter thus :¹ "A total divorce is given whenever it is proved that corporeal imbecility existed before the marriage. In this case, the connection is declared to have been null and void *ab initio*. Imbecility may, however, arise after marriage ; but it will not vacate it, because there was no fraud in the original contract and one of the ends of marriage, the procreation of children, may have been answered." This may be taken, therefore, to be expressive generally of the principles of law regarding dissolution of marriage.

It is with reference especially to actions of declarator of nullity of marriage that the subject of impotency in the sexes assumes greater prominence, although the issue involved is a comparatively limited one.

Within recent years, declarator of nullity has been pro-

¹ *Commentaries*, Vol. I., p. 440 (notes by Christian).

nounced by the Courts on grounds other than physical disability to consummate, such as the existence of insanity at the time of marriage of one of the spouses, which was then unknown to the other spouse or to the friends. That, however, is quite another issue from the one under consideration, and may now be put aside. It is true also that in very isolated instances declarator of nullity may be pronounced when the impediment to the fulfilment of the marriage contract may consist entirely and simply in the deliberate and persistent refusal on the part of either of the contracting parties to consummate the marriage, although no reason is apparent that either of the parties was otherwise than normal sexually. But this issue may, like the former, be also put on one side.

In the ordinary case, which must occupy most attention, the issue will be narrowed down to the answer to the question: Does there exist such physical defect or deformity or psychic condition in the spouse, against whom the action of declarator is laid, which will prevent, and be likely to continue to prevent, the consummation of the marriage? According to the principles of the law of marriage, if a man and a woman are joined in wedlock, and if some time afterwards it shall be shown that consummation of the marriage has not been and cannot be accomplished owing to the bodily disability of either of them, a competent action of declarator would lie against the spouse thus physically incapacitated; provided it be proved that the disability existed at the time of the marriage, and was unknown to the other contracting party, on the ground that marriage was not only instituted to prevent fornication but for fruitful procreation.

The criterion of lawful marriage, therefore, is the presupposition that each contracting party is willing and is able to give the reasonable and natural use of the body to the other in the act of physical intercourse. Stated broadly, the position is this: An action of declarator of nullity will only lie against a husband, if by reason of impotency arising from imperfect conformation of pre-marital origin or from malformation or defect of the external genitals of an irremediable kind, or from any other cause less apparent, be it of mental or psychic origin, he is prevented absolutely from consummating

the marriage; against a wife, if she be of such pre-marital conformation that it prevents, and is likely to continue to prevent, her from enabling the marriage to be consummated.

These pre-marital defects or deformities are most frequently of congenital origin, due to defective embryological development; but sometimes they may not be congenital, and may have arisen, or may have been produced, after birth from different causes. When, therefore, an action of declarator is raised by the wife against the husband, and the husband defends the action, the procedure usually observed in England is that two or more medical men are appointed to examine the husband privately. The defendant must submit to such examination as the medical examiners shall think necessary for the guidance of the Court, in order to verify the existence or absence of any apparent cause of the alleged impotency.

But in order further to establish the averments of the plaintiff, it is equally necessary that an examination be made of her body, in order to show that, notwithstanding her cohabitation with the defendant, she is still not only *virgo intacta* but *apta viro* as well.

While, perhaps, in such cases some physical cause which accounts for the inability to consummate the marriage is likely to be disclosed in the examination of the defendant, it is not always so, but, if such is revealed, it is likely to resolve itself into some defect or malformation of the external genitals, such as hypospadias, epispadias, or other form of phallic deformity, fistula in perineo, disease of penis or testes, absence of testes, or some form of so-called hermaphroditism. Even in these circumstances it is not always easy to aver from examination that impotency exists of such degree as to preclude entirely the possibility of penetration. For example, hypospadias of the first degree does not of itself produce impotency. Cases are on record in which fruitful procreation has resulted with such deformity.¹ While, as a rule, it is true that congenital cryptorchidism is likely to be productive eventually of impotency, because of changes in the sexual orgasm which follows absorption of the testes within the abdomen, each individual case must be considered critically before a definite conclusion is reached. Defects of the phallus, either of con-

¹ Glaister: *Text-Book of Medical Jurisprudence*, Third Edition, p. 396.

genital origin or from partial amputation of the organ by accident, or by operative procedure for disease after the attainment of puberty, also compel most careful consideration, because, although complete penetration is perhaps impossible, there may remain for a time sufficient erectile power to attain sufficient *introitus* to procreate. Rare examples of this are known.

Cases of so-called hermaphroditism account for not a few instances of impotency. It is sometimes difficult to determine from the external appearances only of the male genitals whether one is dealing with some psychic defect, or with some internal teratological peculiarity. Rushton Parker has recorded one such interesting case.¹ This man had married a wife, but all attempts at coition on his part had proved futile; indeed, six months after marriage consummation had not been accomplished. Both the man and his wife observed that he had periodic monthly discharges of blood *per urethram* which lasted usually for about three days. On examination of the man, nothing unusual physically was detectable; his external genitals seemed to be normal, although the testes were decidedly small and soft. He himself stated that he had never experienced any sexual desire, and had never practised onanism. Parker concluded, despite the fact that rudimentary testes had descended into the scrotum, that this man was likely to have, in addition, a uterus and Fallopian tubes.

A variation of this malformation is recorded by Fibiger, of Copenhagen, in which this observer was fortunately able by post-mortem examination to disclose the precise character of the abnormality.² Further variants of departure from the normal *sexe-ensemble* are now largely available for study by those who desire to pursue this aspect of the subject. A valuable paper by F. L. Neugebauer on "Cinquante cas de mariages entre des personnes du même sexe avec plusieurs procès de divorce par suite d'erreur de sexe,"³ and one by Berry Hart, of Edinburgh "On the Atypical Male and Female Sex-Ensemble (so-called hermaphroditism and pseudo-hermaphroditism),"⁴

¹ *Brit. Med. Jour.*, 1899, p. 272.

² *Arch. f. Path. Anat.*, 1905, CLXXXI., 1.

³ *Rev. de Gynéc.*, 1899, Vol. III., p. 195.

⁴ *Edin. Med. Jour.*, October, 1914.

are full of information on this subject.

The term relative impotency has sometimes been applied to the condition in which a man, although so far as medical examination of his external parts of generation could discover, was normal in these parts, has been unable to consummate the marriage with the woman he has married. This is undoubtedly a very rare condition. But it has come under the purview of the Courts in cases in which an action of declarator of nullity has been raised by a wife against her husband. Within comparatively recent years two cases of this kind have been brought before the Courts in Scotland. They have been fully reported.¹ In the former of these, the medical examination of the defender, who was a farmer, showed that he was quite healthy, that there was no anatomical or visible defect in his external parts, nor any evidence of disease or of malpractices to account for his failure to consummate the marriage. The examiners were of opinion that he had some slight mental peculiarity which affected that part of his brain which regulated his sexual functions. Another woman might have excited his passion, and he might be impotent only *quoad* his wife. Decree of nullity was passed.

In the second case, the wife raised an action, but prior to that the husband had raised a like action against the wife. At the hearing of proof, the wife stated that although she had lived with her husband for over two and a half years, occupying the same bed with him, the marriage had never been consummated, notwithstanding that attempts had been frequently made. The medical evidence after examination of the wife was that she was a perfectly healthy and normal woman sexually, that there was no evidence of physical or nervous obstruction, nor of *vaginismus*. They had also examined the husband and had found his external genitals to be normal. They were forced to the opinion that consummation of the marriage must have been prevented by some nervous or functional disorder operating while attempts at coitus were being made. Decree of nullity was awarded the wife.

The opposite case may now be considered, which is, when the husband raises an action against the wife. The criterion

¹ Scot's *Law Times Reports*, Vol. I., p. 264; *ibid.*, p. 266; Glaister, *Op. cit.*, p. 39.

in such a case will be simpler, and will consist in the answer to the question : Has the pursuer been denied reasonable and natural access to or use of the body of the defender, owing to such physical and irremediable defect of the vaginal portion of the genitals as to preclude the possibility of coitus?

It should not be difficult to determine in such a case after examination whether the parts are of such formation as to permit partially or to prevent entirely access of the husband to her body, because there is likely to be present some visible and tangible defect or deformity. The variants of departure from the normal and typical female *sexe-ensemble* are comparatively numerous, and are of differing kinds and degrees. But the particular point, to which attention has to be directed by the examiner, is the condition of the vagina, if present ; because it is with respect to the presence of the vagina and its dimensions on which the question of facility of access and use will turn, and on which, moreover, will depend the issue or non-issue of a decree of nullity of the marriage. In other words, it would appear that if the vagina were absent or were so imperfect as not to permit reasonable and natural access, the law would vacate the marriage. But it is equally clear that all that a plaintiff in such a case can demand of a wife is reasonable and natural access ; hence, if such access be available, notwithstanding the entire absence of the other sexual parts necessary to fruitful procreation, the suit would not prevail in law. Should, however, the impediment to consummation depend upon some condition which is surgically remediable, and should the defendant be willing to undergo the necessary operation, the Court would either dismiss the suit, or would suspend judgement until the effect of the remedy could reasonably be judged.

It would appear, therefore, from legal judgements that in entering into a contract of marriage, a woman does not guarantee that she possesses the entire *sexe-ensemble* typical of the perfect woman, or that if she is the possessor of these they are without blemish, and, by extension of this view, she does not undertake or guarantee to bring forth children ; all that she must do is to guarantee reasonable and natural access to and use of her body. In like manner, the development or production of any condition preventive

of continued marital relationship, at some time subsequent to the consummation of the marriage, will not in this country afford a legal ground for dissolution of the marriage or divorce, since the contracting parties by the act of union in marriage do not bind themselves to maintain during the whole continuance of the marriage the physiological bodily conditions, in which they were at the time the marriage contract was made.

In this respect, the common law of Germany differs from that of this country relative to causes of divorce. "Any incurable cause of complete inability to discharge the matrimonial duty, even though it have first originated after marriage, gives occasion for divorce. The like is the case with any incurable bodily infirmity which excites loathing and disgust or wholly prevents the attainment of the object of marriage."

Summing up the conditions, already discussed, which would enable an action of declarator of nullity of marriage to lie in this country, the following would probably express the main conditions, viz. :—

- (1) The existence in the spouse, against whom the suit is laid, of an evident and irremediable bodily defect or infirmity, physical or physiological, which offers complete impediment to the consummation of the marriage ;
- (2) That the said defect or infirmity existed at the time the contract of marriage was made, and was not revealed to the other spouse before the marriage ;
- (3) That the said defect or infirmity was not remediable, or, if remediable, that the spouse refused to submit to the necessary operation ; and
- (4) That the defect or infirmity did not develop, or was not produced, after due consummation of the marriage.



THE CORRECT LIFE-HISTORY OF FISTULA-IN-ANO.

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It is my concern in this article to attack, and if possible to destroy, certain widely held, but to my way of thinking, misleading ideas of the causation of fistula-in-ano. I must premise that I am speaking of fistula other than tuberculous, which stands in a category all by itself. With increasing experience, I have been led to the conclusion that the percentage of cases of genuinely tuberculous origin is much smaller than is commonly thought. I do not believe that the tubercle bacillus is responsible for more than 5 per cent. of all cases.

What, then, is the cause of the other 95 per cent. of this extremely common malady?

In most text-books of surgery, I find a classification of causes somewhat as follows (there are minor variations of course, but these are some of the usual headings):—

1. *Penetration by foreign body, e.g., fishbone, of rectal mucous membrane.*
2. *Infection of a hæmatoma* resulting from a kick.
3. *Exposure to wet or cold*, particularly on damp seats; and there would appear to be an agreement among surgical writers that the top of an omnibus is peculiarly dangerous in this respect!
4. *Scratching* to relieve pruritus.
5. "*Depraved conditions of the blood.*" I quote literally from a text-book not five years old! The only possible excuse for the phrase is its rather jolly Georgian flavour recalling the "vapours" and "humours" of our ancestors.
6. "*Hæmogenous infection,*" a phrase which is the shibboleth of the latter-day student to account for any

clinical phenomenon whose explanation is not immediately apparent, a sort of twentieth-century pseudo-scientific variant of No. 5 and not one whit more illuminating.

I have come across only one example of a fistula caused by the passage of a fishbone through the bowel wall. I have never been able to satisfy myself that any single fistula had resulted from the causes numbered 2, 3, and 4; and such sanity as I retain, coupled with a sense of humour, has prevented me from taking Nos. 5 and 6 seriously, and thereby wasting my time.

This classification is apparently not completely satisfactory even to its authors, because it is usually bolstered up by the statement that the ischio-rectal fossa is a situation in which abscess formation is likely to occur, because it is a large space containing much fat, ill-supported by loose areolar connective tissue, with an inadequate blood supply. The last phrase, at any rate, is frankly untrue, as any surgeon must know who has had occasion to make an incision into the ischio-rectal fossa.

The real origin of fistula-in-ano is capable of a very simple explanation on anatomical grounds. A knowledge is required not only of the anatomy of the adult rectum, but also of its morphological development. I make bold to quote the following description of the development of the rectum from Mr. Russell Howard's "Practice of Surgery," because it is terse and accurate, and covers the necessary ground in a few lines:—"The rectum is developed from the hind gut, which at first ends blindly at the lower part of the embryo. About the fourth week of intrauterine life an invagination of the epiblast, the proctodæum, occurs at the future anal orifice, and later it unites with the hind gut to form an open passage. Before this occurs, the allantois, *i.e.*, the embryonic urinary and genital ducts, opens into the hind-gut, and there is therefore a common cloaca for the hind-gut and the urogenital sinus. About the tenth week this cloaca becomes divided by the growth of a longitudinal septum, the anterior or urogenital segment being thus divided from the posterior or rectal segment, the perineum being formed between the two. About the twelfth week the proctodæum

joins the hind-gut. The development of the rectum and anus is then complete."

The level, at which the junction between the proctodæum and the hind-gut finally becomes complete, is situated exactly between the two sphincters, that is below the internal and above the external; this line of junction is represented throughout the subsequent life of the individual by a row of small elevations above the surface of the mucous membrane of the anal canal, usually from five to eight in number. These are the anal papillæ. They are somewhat analogous to the carunculæ myrtiformes which are left at the periphery of the ruptured hymen. They can be seen in a normal anus, if the mucous membrane is gently pulled down with two fingers in a good light or through a speculum, as soft whitish pyramidal protuberances, about one-eighth of an inch long from base to summit; and they can be felt by the examining finger as soft bodies at the level between the two sphincters which slip out of the way as the finger advances.

These papillæ are one of nature's imperfections. They not only serve no useful purpose that I know of, but they are the direct cause of much rectal trouble; and yet I am continually amazed at finding that students, even post-graduate ones, have never heard of their existence. They are, in my view, the cause of both fissure and fistula-in-ano; and the whole painful story starts from the passage of a constipated motion.

The motion tears down one of these papillæ. It is better for the patient that it should be torn completely, carrying a strip of mucous membrane down to the margin of the anus. In this case a fissure results in the exposed raw area, and the loose portion of mucous membrane, whose apex is the papilla, becomes infiltrated with granulation tissue, and is subsequently known as a "sentinel-pile." No deeper infection results because the whole area is exposed and a sort of natural drainage has been established.

But in the other less fortunate cases, what happens? Instead of the papilla being torn right down, it is only detached from its base, and an inadequately drained opening

is made in the mucous membrane. The rectum not being an aseptic tract, infection follows, which leads to suppuration and finally to fistula. I am convinced that this is the starting point of ninety-nine fistulæ out of every hundred ; and for this reason—the papillæ are situated between the internal and external sphincters and so is the internal opening of every complete fistula. When the internal opening is missed, as it not infrequently is, it is because it has been sought for *too high up*. There may be a high internal opening, but, as I shall show later, that is always an additional one secondary to the primary one situated between the two sphincters.

In the light of this hypothesis, I will proceed to examine critically a peculiarly vicious diagram, which I find from time to time in examination papers and in student's notebooks, purporting to explain the course of perianal and perirectal suppuration. I regret to say I have even seen it in text-books.

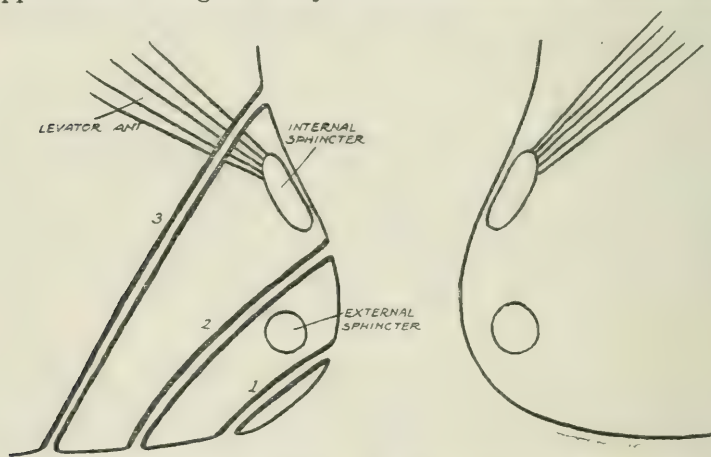


Fig. 1.—(1) Track of perianal fistula. (2) Track of ischio-rectal fistula. (3) Track of pelvi-rectal fistula.

It must have been invented during the dark ages by some thoroughly evil person, and handed down from generation to generation of students. It is a model of inaccuracy. It is so incorrect that I cannot expose all its fallacies at one blow, but propose rather to deal separately with the three varieties of fistula depicted in it, showing the incorrect and correct versions in juxtaposition.

I. Perianal fistula (which I prefer to call a marginal fistula,

but this is a small point).

The mistake here is in the position of the internal opening, which is always situated at the intersphincteric level, which is the level of the papillæ. It is never situated below the external sphincter, as the left side of the diagram would have

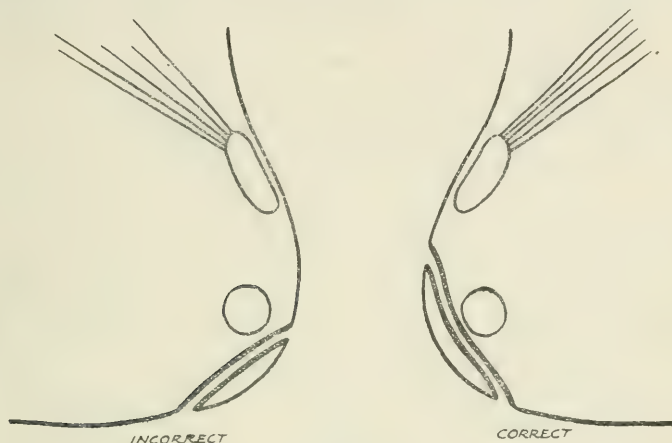


Fig. 2.

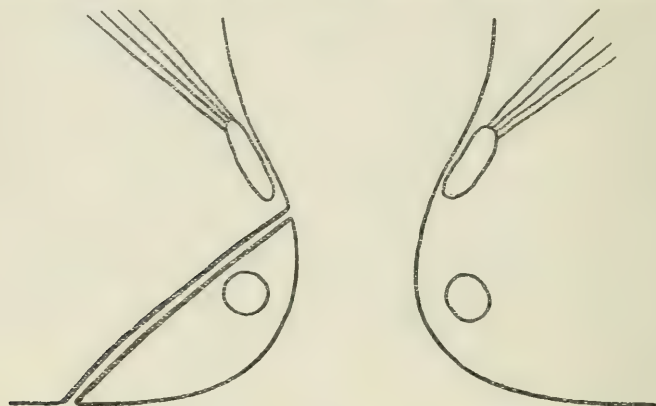
one to believe. The pus makes its way to the surface in the perianal skin without ever involving the ischio-rectal fossa proper.

II. Ischio-rectal fistula, better named complete fistula-in-ano.

Of the two diagrams which follow, the upper is incorrect and the lower, which is correct, shows two stages in the development of a complete fistula-in-ano.

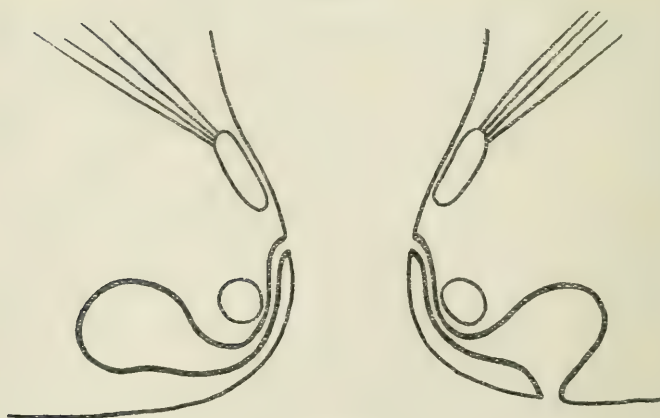
In diagram No. 3, the internal opening is shown at the right level, but the track of the fistula is wrongly shown. What happens is, that a submucous infection starts at the level of the torn papilla, which is the future internal opening, but it does not make its way straight between the two sphincters to a point in the skin of the ischio-rectal fossa. It does what an infection does elsewhere in the body, and is not an exception to the rule; it follows the line of least resistance. Now the line of least resistance in this region is surely not to burst through the rectal wall at that level, where it is very resistant, but to travel *submucously* down towards the margin

of the anus and track out below the external sphincter into the ischio-rectal fossa, in which it can spread with comparative ease, thus reaching the stage shown in left side of diagram No. 4 of blind internal fistula. This is the real state of affairs in most so-called ischio-rectal abscesses. Later, the track makes its way through the skin naturally, or an incision is made and



INCORRECT

Fig. 3.



CORRECT

Fig. 4.—Showing, on the left side, the preliminary stage of blind internal fistula and, on the right, the final stage of complete fistula-in-ano.

then the complete fistula, as shown on the right side of Diagram 4, is established.

If I am correct, there is an obvious corollary, which is that the track of a complete fistula-in-ano passes *below* and

not *above* the external sphincter; and a still further and more important one, that it is, therefore, not necessary in operating to cut the external sphincter at all. I may be accused of seeing dreams, but I contend that this is so; the advantage of curing a fistula without cutting the sphincter is undeniable. The unamiable risk of incontinence is removed, and the surgeon who cuts even the external sphincter always runs that risk, cut he never so wisely.

I have argued this point with other surgeons, and I am told that I must be wrong, because, they say, when the probe is passed from the external to the internal opening, the external sphincter can be felt below it.

The explanation is twofold. Either they push the probe forcibly directly from one opening to the other, but not along the real track of the fistula, in which case the sphincter must, of course, be cut; or they pass the probe correctly along the track, but are misled as to the nature of overlying tissues. In old-standing cases, this tissue is much thickened by chronic inflammatory change, so that it is now a localized mass of fibrous tissue, which may, and does, resemble the sphincter, and be mistaken for it. On more than one occasion, when visiting other hospitals, I have been able to demonstrate, at the risk of losing a friend, the intact sphincter in the depths of the wound after it had been thought to be divided. What had been cut was only this band of fibrous tissue.

III. Pelvi-rectal fistula and fistula-in-ano with high internal opening (two entirely different conditions).

Diagram No. 5 is perhaps the most vicious of all. It not only represents a condition which does not exist, but it might also induce anyone who trusted it to pass a probe along the supposed track and cut through the overlying structures, thus doing irreparable damage to the rectum, with the certain result of complete incontinence. There is a hopeless confusion of thought in Diagram No. 5 between two entirely separate conditions, a pelvi-rectal fistula proper and a fistula-in-ano with a high internal opening. A pelvi-rectal fistula has nothing whatever to do with the rectum, apart from the fact that the pus makes its way to the surface in the ischio-rectal fossa by passing through the levator ani muscle and *travelling by the side of the rectum*. It has no internal opening in the

It is the late result of a primary focus of infection above the pelvic diaphragm, starting in the peritoneum, retroperitoneally, or in the bones of the pelvis.

The other condition with which it has been confused is a fistula-in-ano with a high internal opening (Diagram No. 6, right side). In this the initial stages are those of an ordinary

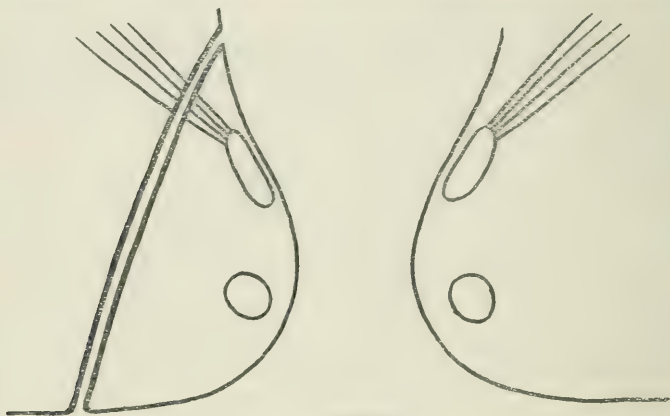


Fig. 5.

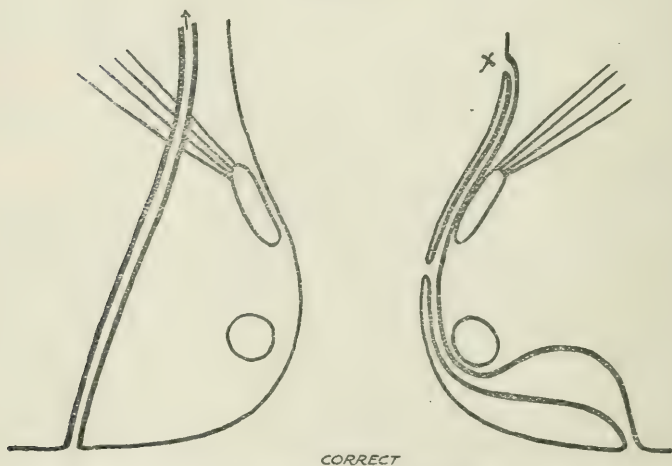


Fig. 6.—Showing, on the left side, a real pelvi-rectal fistula, and, on the right a fistula-in-ano with secondary ascending submucous track and high internal opening at X.

fistula-in-ano, but the infection travels submucously upwards

as well as downwards from the original internal opening ; after ascending for a variable distance, generally from two to three inches, it again makes its way into the rectum through a second higher internal opening. The submucous track can be felt in the wall of the rectum as a finger- or pencil-like process. In this case the fistulous track must be opened from the external to the primary internal opening in the ordinary way ; then the ascending submucous track must be opened up along the rectal wall, as far as the secondary internal opening. Even here, therefore, it is not necessary to cut the sphincter. The great difficulty is with hæmorrhage. It is impossible to put ligatures on a bleeding spot in the rectal wall, about $3\frac{1}{2}$ inches up, and my practice, when I meet this difficulty, is to put on one or more pairs of Spencer-Wells forceps, and leave them *in situ* for 48 hours.



INFLAMMATORY DISEASE OF THE MAXILLARY ANTRUM—ITS DIAGNOSIS AND TREATMENT.

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[With Plates I.—VI.]

IN many instances, the diagnosis of infection of the maxillary antrum presents no difficulties, and there is no doubt as to the line of treatment to be adopted.

In other cases, however, it is not always easy to determine whether there is disease of the cavity, and, if this be the case, to what extent the mucous membrane lining is affected. Again, as a result of old suppuration, or of the means taken to cure it, an antrum may give some of the tests which we are accustomed to regard as signs of disease.

The object of this paper is to show how these difficulties may, to a large extent, be overcome and how, by a suitable combination of tests, the condition of the cavity and of its lining membrane may be ascertained with a fair degree of certainty.

PATHOLOGY.

The mucous membrane of the antrum is continuous with that of the nose through the ostium maxillare, an opening in the hiatus semilunaris covered over by the middle turbinal. There may be one or more accessory ostia. The mucous lining frequently participates with the rest of the nasal mucous membrane in any infection of the latter, as in the ordinary infective cold. Whereas the nose drains efficiently, the antrum through its anatomical relations only empties itself of fluid when it is full to overflowing, or when the patient is recumbent. This absence of free drainage makes for more

severe infection of the cavity than of the nose.

The other source of infection of the cavity is through the teeth. An abscess at the root of a molar or bicuspid not infrequently bursts into the cavity, or the thin bone which separates the tooth roots from the cavity becomes gradually eroded. An acute antral infection frequently resolves without causing a degeneration of the mucous membrane.

The antral mucous membrane may undergo progressive degeneration and death with the formation of pus, sloughs, and granulation tissue without any acute attack, or may become the seat of a partial or total conversion into polypi without marked suppuration. This condition is similar to the "dry ethmoiditis" with formation of polypi to which the ethmoid cells are subject.

An antrum may be subject to recurrent acute attacks of inflammation with complete resolution and a return to the normal. A chronic antrum is frequently the seat of acute exacerbations.

It can be seen, therefore, how important it is to find out the condition of the antral mucous membrane, both as regards prognosis and treatment, and that it is not sufficient to make a diagnosis of acute or chronic antritis.

For instance, in the case of recurrent attacks of antritis, with a healthy normal mucous membrane in the intervals, there is probably an undue susceptibility to infection of the nose. If the acute attack is treated locally, and the organism or organisms responsible can be isolated, an autogenous vaccine may afford a prevention of recurrence, and operation may be unnecessary. If the antrum contains polypi, even without a chronic abscess, nothing short of scraping away the unhealthy portions of the mucous membrane will effect a cure. In an acute inflammation of the antrum, if a genuine acute attack without previous disease, the condition will usually resolve with appropriate local measures.

If an acute attack takes place in a chronic case, although it will be best to postpone an operation if possible until the former has subsided, operation will certainly be necessary eventually.

We were first led to investigate these cases owing to the difficulty of ascertaining the condition of the lining of the

antrum by the recognized tests. Taken singly, the tests are all liable to fallacies. X-rays are no exception to this rule, but by combining X-rays as a routine with transillumination, together with anterior and posterior rhinoscopy and a careful consideration of history and symptoms, we have been able to arrive at accurate conclusions. These have subsequently been verified and found correct in the following series by radical operation and direct examination of the mucous membrane of the cavity, or in cases not operated on, by the progress of the case and subsequent testing.

With regard to X-ray photographs of the antrum, improved methods and technique, together with the experience gained by direct confirmation of the diagnosis previously made, have enabled us to speak more certainly with regard to the X-ray examination than could formerly be done.

As instances of cases in which, in view of the results of our researches, X-rays would have been very useful, may be quoted the following :—

A.—The patient, a man of 40, had marked antral symptoms with pain and tenderness over the left cheek. He complained of catarrh and cold-catching, and dated his pain and tenderness from a recent cold. No pus could be found in the nose. Transillumination showed no marked crescent either side, but was equal; puncture and lavage caused much pain, was difficult, and showed no pus. The teeth were sound. Eventually, the antrum was operated on by the Caldwell-Luc method, and was found to contain polypi, but no mucus or pus.

X-rays would have shown this case dark, and confirmed the diagnosis, in opposition to the results of puncture and lavage, and so much time and distress would have been saved.

B.—A lady of 50 complained of similar symptoms, but they had continued for a year. On transillumination, the antrum was very dark; on puncture and lavage, thin pus was obtained. In view of the duration of the symptoms, operation was advised, but the patient being averse to this and wishing to try repeated puncture and lavage, this was consented to, but little hope of a cure by this means was given. After the second washing out the fluid returned clear and continued to do so for the remainder of the six washings, while her symptoms entirely disappeared.

In this case, an X-ray examination, soon after the antrum has been washed out, would probably have shown that it was clear, indicating that there was no chronic disease, and a better

prognosis would have been given.

PHYSICAL SIGNS OF INFLAMMATION OF THE ANTRUM.

Anterior rhinoscopy.—Presence of a streak of pus or mucus under the anterior end of the middle turbinal.

Posterior rhinoscopy.—Pus or mucus flowing under the posterior end of the middle turbinal or lying in the post-nasal space.

Fallacies.—*Presence of pus* may be due to suppuration of one of the other nasal accessory sinuses. *Absence of pus* may be due to the fact that the antrum has recently emptied itself, or that the inflammation is not of a purulent nature at the time of examination.

*Transillumination.*¹—*Absence of crescent* may be due to pus or mucus in the cavity, or to chronic thickening or degeneration of the walls of the cavity. *Presence of crescent* shows a healthy antrum.

Fallacies.—*Absence of crescent* may be due to thickness of coverings, *i.e.*, dense face bones or a fat face. *Crescent may be present* when the antrum contains polypi, but no pus or mucus; or, the antrum may show hyperclear in cases of dental cyst or large single antral polypus.

*Puncture and lavage.*¹—The *presence of pus* shows suppuration in the antrum. The *absence of pus* shows a healthy cavity.

Fallacies.—*Presence of pus.* The antrum may simply be acting as a reservoir for pus which has trickled in from a suppurating frontal sinus. If the nasal cavity is not first cleansed of secretion lying in it, this may appear on washing out the antrum and be thought to come from the cavity of the latter. *Absence of pus* does not exclude infection, for the cavity may have emptied itself at the time of examination, or the disease may not be of a suppurative nature.

X-rays.—A marked opacity of the antral area denotes a cavity containing pus or chronic thickening and degeneration of the mucous membrane of the walls. It is seen, too, in the presence of a single polypus or multiple polypi. X-rays also show tooth stumps, unerupted teeth, cavities round the teeth, alveolar abscesses leading into the cavity, or pyorrhœa. As these conditions may bear an important relation to antral

¹ See page 44 for technique.

disease, the importance of their detection will be manifest.

Fallacies.—An antral opacity, if present, may be due to a former radical operation, when the cavity, whether healthy or not, remains dark ; if *absent*, this does not exclude mucus or even thin pus, if the latter does not fill the cavity.

TECHNIQUE.

Transillumination.—An ordinary transilluminating lamp is placed in the mouth, and the patient examined in a dark room or under a dark cloth. The most important point to notice is whether there is a crescent of light under the eye. The whole cheek may appear lighter on the side of an antral polypus or dental cyst.

Puncture and Lavage.—This is usually performed, after cocainizing the inferior meatus, by placing the point of a Lichtwitz's trocar against the maxillary process of the inferior turbinal, and pressing upwards and outwards so that it enters the cavity, which subsequently is washed out through the cannula. Personally, I have found this more satisfactory than attempting to suck the secretion out by a syringe.

It has been possible to dispense with puncture and lavage as a diagnostic measure in many cases ; this is frequently an advantage, for the results are often uncertain, and a negative result does not show that an antrum is necessarily free from disease. The process may be painful, especially in cases of acute inflammation. Further, there have been cases in which symptoms, varying from discomfort to severe collapse, have followed this test.

Puncture and lavage are often useful as a method of treatment, but should be checked by X-ray examination. See Case B.

RADIOGRAPHIC EXAMINATION.

The radiography of the antrum presented at first a certain amount of difficulty. It was necessary to obtain a sharp view of the antrum as clear as possible of other shadows, and to get both antra on one plate so that their density could be compared. In the ordinary antero-posterior view of the head, the posterior part of the base of the skull obscures the shadow of the antrum, but by tipping the head forward it was found possible to obtain both

PLATE I.

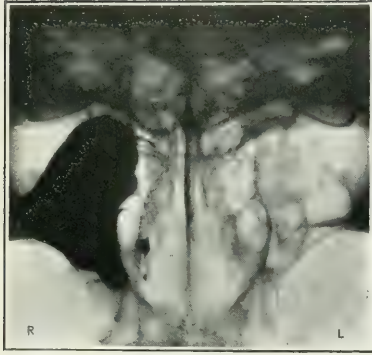


Fig. 1.—Adult skull; anterior view. Right antrum filled with bismuth.

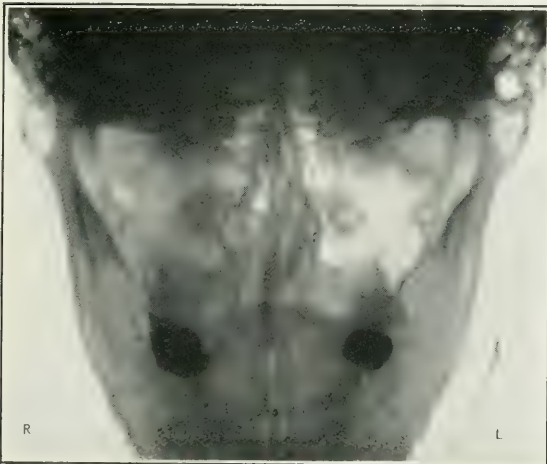


Fig. 2.—Face; anterior view. Chronic disease of right antrum.

PLATE II.

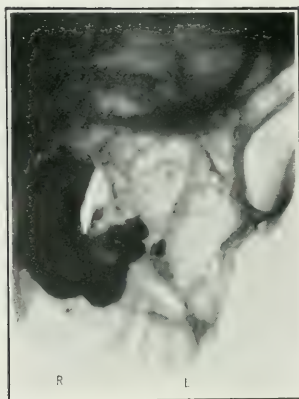


Fig. 3.—Adult skull; *right antero-lateral oblique view*. *Right antrum incompletely filled with bismuth.*

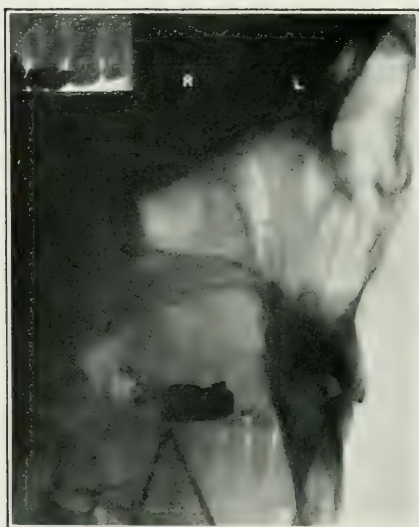


Fig. 4.—Face; *right antero-lateral oblique view*. *Same case as Fig. 2. Right antrum opaque. Inset: Molar and 2nd bicuspid teeth; intra-oral view. Cavities around roots of 2nd molar.*

antra side by side, and obscured only by the other facial bones and the cervical vertebræ (Fig. 2, Plate I.). To obtain the best position, we injected the antrum of a skull with bismuth, and manipulated this skull in various ways to get the best pictures of the antrum. In addition to the antero-posterior view (Fig. 1, Plate I.), we found that it was quite possible to get a good oblique view (Fig. 3, Plate II., and Fig. 5, Plate III.), and have been able to repeat this in the living (Fig. 4, Plate II., and Fig. 6, Plate III.). It has not quite the importance of the anterior view, but it is most useful to confirm the findings of this, and in it one side of the alveolus is seen quite separately from the other. It is most useful in the diagnosis of unerupted teeth or cavities around the apices of the teeth, and may show whether these communicate with the antrum or not. In examining the radiograms of the skull, the unfilled side must be compared with that containing bismuth, in order to understand better the radiogram in the living.

The normal antrum varies a good deal in size and apparent opacity in the living, and, when both antra are diseased, unless they are very opaque, it may be difficult to judge whether the amount of opacity is sufficient to indicate disease.

It must always be remembered that radiograms of the antrum are only a physical sign, and in the diagnosis of the condition they must be taken in conjunction with the other physical signs. It is, too, quite a fallacy to suppose that the results of transillumination are the same as those of X-rays, and that the former method can be used as a substitute for the latter. Both methods have their value, and both should be used in addition to other forms of examination in most cases.

If a clinical classification of infected antra be now made, we can write down from these data the physical signs which will accompany each.

<i>Conditions.</i>	<i>Symptoms.</i>	<i>Transillumination.</i>	<i>Puncture.</i>	<i>X-rays.</i>
Acute antrum with inflammatory swelling of mucous membrane, but without pus.	Pain, tenderness, nasal obstruction, malaise, temperature, coryza.	Dark.	No pus; painful; perhaps impossible to wash out.	Dark.

Condition.	Symptoms.	Trans-illumina- tion.	Puncture.	X-rays.
Acute antrum with mucus or pus.	As above.	Dark.	Mucus or pus.	Light or dark.
Subacute antrum with mucus.	Less marked.	Dark.	Mucus.	Light.
Chronic antrum with degenerated mucous membrane and pus.	Unilateral nasal discharge; bad smell in nose; post-nasal catarrh.	Dark.	Pus often foul.	Very dark.
Chronic antrum containing polypi.	Discomfort over cheek; subject to acute attacks.	Clear.	Often fluid returns clear or does not run.	Dark.
Single antral polypus.	History of post-nasal polypi or presence of one.	Hyper-clear.	Often impossible to wash out.	Dark.
Dental cyst occupying part or whole of antral space.	Discomfort over cheek; swelling of cheek.	Hyper-clear.	Impossible to wash out.	Dark.
Unerrupted tooth associated with antral symptoms, but without antral disease.	Pain; neuralgia over antrum.	Clear.	No pus.	Clear, but shows tooth.
Do., but with antral disease.	Do. do.	Dark.	Mucus or pus.	Clear if only mucus; dark if pus.

Malignant Disease.—In malignant disease of the antrum, the disease may either start within the cavity or invade it from the ethmoidal or pterygoid region. The outer wall of the nose is soon invaded, and growth is then seen in the nasal cavity by rhinoscopy. The cheek becomes swollen from the invasion of the wall of the maxilla; aching pain in the cheek and nasal obstruction, with blood-stained discharge from the nose, are often present. Transillumination shows a dark antrum. X-rays also give a shadow, which may indicate destruction of the bone from encroachment on the boundaries of the antrum. A malignant antrum frequently contains pus, which may thus be obtained on puncture and lavage. Puncture or even examination of the nose readily causes bleeding.

As a result of keeping a careful record of cases with their

PLATE III.



Fig. 5.—*Adult skull; left antero-lateral oblique view. Right antrum filled with bismuth.*



Fig. 6.—*Face; left antero-lateral oblique view. Same case as Fig. 2. Right antrum opaque.*

PLATE IV.

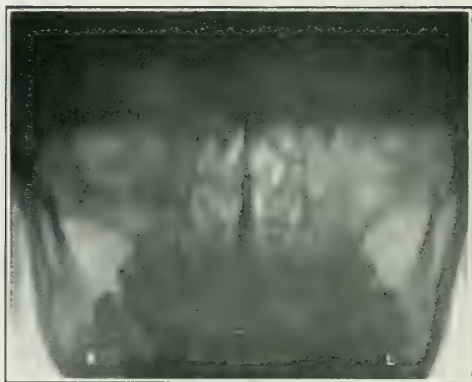


Fig. 7.—Face; anterior. Right antrum contains sloughs and pus.



Fig. 8.—Face; anterior. Right antrum contains polypi. Left antrum contains mucus. Left sphenoidal sinus contains polypi.

tests and observing the conditions found at operations, we have been able to draw up a table of diagnosis, which may be compared with the notes of recorded cases, which are appended. In some cases, in which no operation has been found necessary, subsequent examinations by transillumination and X-rays have been made after the symptoms had disappeared.

SCHEME OF DIAGNOSIS BY MEANS OF A COMBINATION OF THE RESULTS OF
TRANSILLUMINATION AND X-RAYS.

Using these two methods, it is obvious that we can have four different possible combinations of results.

1. Antrum clear by both methods.
2. Antrum dark by both methods.
3. Antrum clear to transillumination and dark to X-rays.
4. Antrum dark to transillumination and clear to X-rays.

The indications presented by these various combinations are as follows :—

1. When an antrum is clear by both methods, it is unlikely that it is the seat of disease.

2. An antrum dark by both methods occurs with—

- (a) Antrum containing pus.
- (b) Chronic degeneration of the mucous membrane with pus.

This may be due either to sloughs with pus or polypi with pus. Fig. 7 (Plate IV.) and Cases I. and II.

(c) An antrum which has been operated on (sometimes).

(d) Neoplasm.

With regard to (a), the results of treatment will show whether it is clearing up. If an acute attack, a subsequent X-ray picture taken after the acute attack has subsided will show whether the condition is chronic.

With regard to (c), in cases in which a previous operation has taken place, and pus is absent from the nose or antral cavity, an examination of the mucous membrane, by means of pharyngoscope passed through the intranasal opening, or, if necessary, by a digital examination of the cavity under an anæsthetic, will determine whether the mucous membrane is

healthy.

With regard to (*d*), partial or total obliteration of the outline of the antrum in the radiogram, together with other physical signs, usually makes the diagnosis easy.

3. An antrum will be clear to transillumination but dark to X-rays when—

- (*a*) Containing polypi (Fig. 8, Plate IV. (right) and Fig. 9 (right), Cases IX. and IV.).
- (*b*) There has been a radical operation, but the cavity is healthy (Fig. 10 (left), Cases V. and VI.).
- (*c*) When a large dental cyst occupies the antral space.

4. An antrum will be dark to transillumination but clear to X-rays—

- (*a*) When the cavity contains mucus with no degeneration of the mucous membrane. Cases of septal deflection, which are dark to transillumination, often come under this category (Fig. 8, Plate IV. (left), Cases IX. and VII.).
- (*b*) When there are big face bones (Fig. 10 (right), Case V.).

It will be seen that when the results of transillumination and X-rays agree, puncture and lavage are not usually necessary to establish the diagnosis.

When transillumination and X-rays are opposed, the contrast usually gives the diagnosis, if taken in conjunction with the existing symptoms, and the result of rhinoscopy.

After a successful operation, the crescent, in transillumination, is usually found to reappear. After a radical operation on the antrum, whether successful or not, the antrum probably always appears dark to X-rays, so that this method is useless in determining whether the latter has been successful.

The radiograms illustrating the cases should be compared with those of the injected skull, and, to facilitate this, the three views of the first case have been placed opposite to similar views of the skull. In this case, the right antrum is opaque, which is well shown in the anterior (Fig. 2, Plate I.) and in the oblique views (Fig. 4, Plate II., and Fig. 6, Plate III.—): it will be observed that the difference in opacity can be seen distinctly in both the oblique views. In Fig. 3 (Plate II.) it will be noted that the bismuth has not completely

PLATE V.

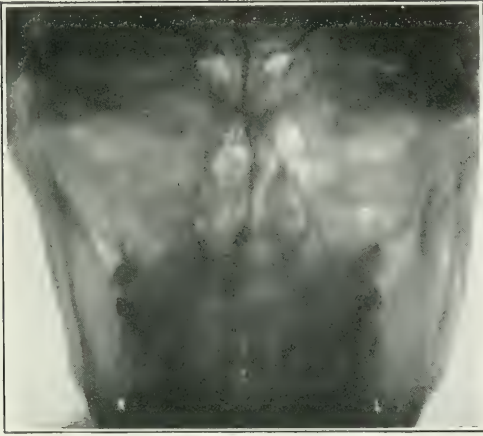


Fig. 9.—Face; anterior. Right antrum filled by one large polypus. Left antrum contains mucus.



Fig. 10.—Face; anterior. A radical operation has been performed on the left antrum.

PLATE VI.

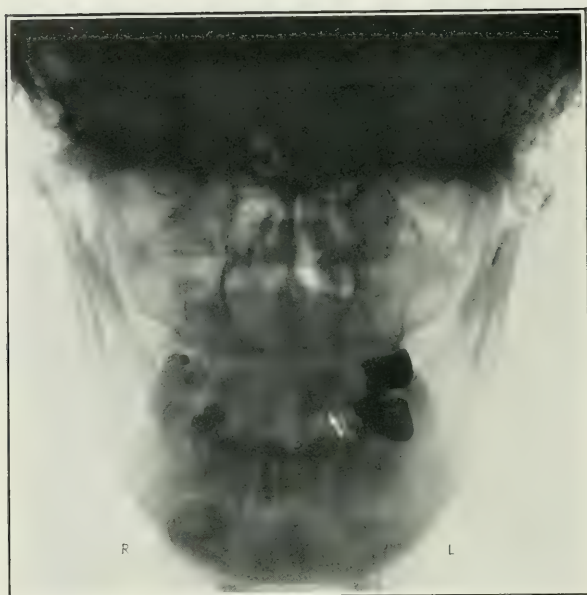


Fig. 11.—Face; anterior. *Unerupted canine tooth on left side. Left antrum contains mucus.*

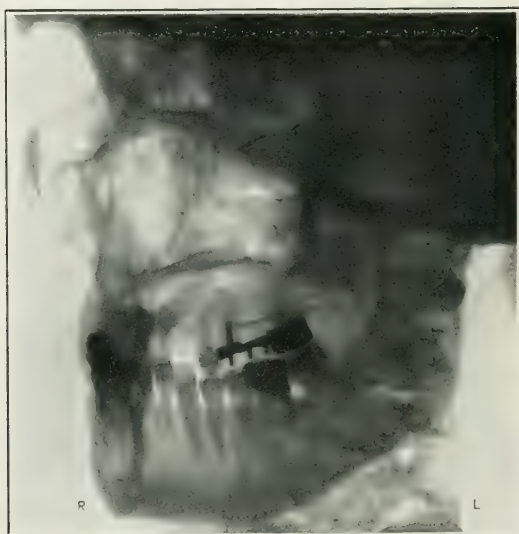


Fig. 12.—Face; left antero-lateral oblique. *Same case as Fig. 11.*

filled the antrum ; it will also be seen that the Figs. 3 and 5 are not taken at precisely the same angle. The case illustrated in Figs. 2, 4 and 6 is one of chronic suppuration of the right antrum, and clinical evidence showed that it contained pus. Transillumination showed that it was opaque, and therefore contained either mucus or pus. X-rays demonstrated that it must be pus on account of the opacity, and this in fact was seen issuing from under the middle turbinal. This case illustrates as well the value of radiography to demonstrate any associated trouble with the teeth. In front of and behind the first molar on the right side, the antral floor is seen to dip down. An intraoral skiagram showed that there were cavities round the roots of this tooth, one at least of which undoubtedly communicated with the antrum. (See Fig. 4A.)

Fig. 7 (Plate III.) illustrates a more advanced case of the same condition as Fig. 2 (Plate I.). Here the cavity of the right antrum was full of pus and sloughs from degenerated mucous membrane. The right antrum is so opaque that its outlines can only be distinguished with difficulty. (Case I.)

Fig. 8 (Plate IV.) illustrates several interesting points. It will be noted that the right antrum is opaque, as well as the left sphenoidal sinus. The right antrum and left sphenoidal sinus were found to contain polypi, and the left antrum contained clear mucus. Transillumination of the antrum showed the right side clear and the left dark, the converse of the X-rays, which enabled a correct diagnosis to be made before the operation. (Case IX.)

Fig. 9 (Plate V.) illustrates a case of antro-choanal polypus, the right antrum being occupied by one large polypus. This patient was examined twice. On the first occasion, the right antrum was clear on transillumination, and on the second hyperclear. The X-rays each time showed the right antrum opaque. On the second occasion, during the course of an attack of influenza with muco-purulent rhinitis, the *left* antrum became dark on transillumination and the radiogram, which is reproduced, shows the left antrum clear, proving that there was no chronic disease. (Case IV.)

Fig. 10 (Plate V.) indicates a case of antrum which has been operated on (Caldwell-Luc operation), but which at the present time is healthy. In this case the cavity which has been operated on was found to be covered by smooth healthy

mucous membrane by digital examination under general anæsthesia. (Case V.)

Fig. 11 (Plate VI.) shows a slightly opaque left antrum, due to an early stage of inflammation, and an unerupted canine which is better shown in Fig. 12 (Plate VI.). (Case III.)

TREATMENT.

The treatment of an acute antrum consists in establishing drainage as soon as possible. The aching pain experienced is due to the outlet of the cavity being blocked, owing to swelling of the mucous membrane.

A 5 per cent. cocaine spray used in the nose will diminish the sensitiveness and shrink up the mucous membrane. A better method is to place a plug of cotton wool, damp with 10 per cent. cocaine, under the middle turbinal, but for this a head light and speculum are required, for it has to be done under direct illumination. An adrenalin spray will also effect the same result, but in some people the reactionary congestion produced makes this inadvisable. After shrinking the mucous membrane, the patient should posture, *i.e.*, lie on the opposite side to the affected antrum with the head low so that the secretion may drain out.

Steam inhalations may help the flow, and a warm alkaline spray is also helpful. It is inadvisable to allow the patient to apply the cocaine.

General measures, such as warmth, rest in bed, aspirin gr. x. four-hourly, and an aperient should be adopted as well.

Under these measures, the acute symptoms usually subside; but if they remain and become more urgent, an anæsthetic should be given, and an opening large enough to allow free drainage made in the inferior meatus.

Puncture and lavage are generally very painful in the acute stage, and although they may be successful, it is sometimes impossible to repeat them owing to the pain, and sometimes too, owing to the swollen mucous membrane of the cavity interfering with the free flow of the irrigating fluid.

Should the acute attack settle down, but there is evidence that the cavity is still secreting pus, puncture and lavage repeated a few times will usually clear up the condition.

Drainage through a tooth socket is not to be recommended,

as this method may convert an acute into a chronic case by establishing communication with the mouth.

In cases in which there is evidence that the mucous membrane has become degenerated and converted into granulations or polypi, as in the chronic cases, the only satisfactory treatment is to perform the radical operation (Caldwell-Luc) and remove all diseased mucous membrane under direct inspection.

CASE 1.—Mrs. L., aged 37. She complained of having suffered from severe attacks of right-sided facial neuralgia, browache and headaches for some years. These had been much worse recently. Two months before being seen by me, she had a severe cold and felt very ill. One month after this she got another bad cold and an ulcerated throat. There had been much discharge from the nose, especially from the right nostril, which still continued. From time to time she had noticed a bad smell in the nose.

On examination of the nose, a streak of pus could be seen under the right middle turbinal. On transillumination, the right antrum was very dark; on puncture and lavage, foul pus was obtained. On X-ray examination, the antrum was dark. (Fig. 7.)

The radical operation was done, and the antral mucous membrane found to be completely disorganized, the cavity containing foul sloughs.

This is a typical advanced case, which shows every classical symptom and physical sign, and in which there was no difficulty of diagnosis.

CASE 2.—Lt. M., aged 24. This patient consulted me for nasal obstruction. He complained that the obstruction varied from side to side of his nose. He had a dull headache at times and always felt tired. The middle and inferior turbinals were much enlarged, there were no adenoids (the adenoids had previously been removed for the same symptoms).

On transillumination, the left antrum was dark. On puncture, no pus was obtained. The cavity was washed out with difficulty, for the fluid only flowed under considerable pressure. X-rays showed the left antrum very dark.

At the operation, portions of the turbinals were removed and the radical antrum operation was then done. The cavity was found full of granulations, among which were strands of thick ropy pus.

This case shows a less advanced condition than the preceding case, for the granulations had not been reduced to sloughs. It illustrates the condition in which transillumination and X-rays show the diagnosis, while puncture fails. There was, too, an absence of antral symptoms.

CASE 3.—Miss C., aged 50. She complained of having an acute and streaming cold two months previously. With this she had orbital and frontal headaches. One month ago, a second cold and sore throat, and since then she had suffered from post-nasal catarrh. There was a

gold crowned molar and a bridge connected with this and the stump of a bicuspid. No pus or mucus was seen in the nose even after posturing.

The left antrum was dark on transillumination. Puncture and lavage were not done, but on X-ray examination, the left antrum was seen to be slightly dark and there was an unerupted canine on the floor of it. (Figs. 11 and 12.)

She was not operated on until a month later. At the radical operation, the antrum was found to contain granulations but no pus. The tooth bridge, crowned molar, and stump were removed at the operation as well as the unerupted canine.

This case shows a similar condition to that of Lt. M., but the case had not progressed as far, thus accounting for the less dense X-ray shadow.

CASE 4.—Miss K., aged 25. She had had a large choanal polypus removed two years previously. She came to me complaining of nasal obstruction, and thought the polypus must have returned. I found that she had no recurrence of the polypus, but that her obstruction was due to a septal deflection and enlarged turbinals.

On transillumination, the right antrum was somewhat hyperclear. On X-ray examination, the right antrum was quite dark.

I made the diagnosis of antral polypus, and after doing a submucous resection and turbinectomy, I punctured the right antrum. (Fig. 9.) No flow of air or fluid could be obtained through the cannula, and on opening the right antrum, I found it occupied by a single large polypus.

A second examination, during the course of an attack of influenza before the operation, showed the left antrum dark to transillumination, probably due to the presence of mucus within it, but was clear to X-rays owing to the absence of chronic disease.

CASE 5.—Mr. H., aged 35. He had had a radical antrum operation done some years previously on the left side, and the result had been satisfactory. He now complained of similar discomfort on the right side of the face, with nasal obstruction and catarrh on that side.

On examination, no pus could be seen in the nose, but the right inferior turbinal was enlarged. On transillumination, both antra were dark, but he had a fat face and large bones. On puncture, no pus could be obtained.

The symptoms continued and a radiogram was taken. This showed a dark left antrum and a clear right one. At his urgent request, I opened the right antrum, when it was found to be quite normal with healthy mucous membrane and contained no fluid.

Again the X-ray diagnosis was correct, and in this case confirmed the result of puncture but was opposed to the result of transillumination. The left antrum having been operated on was dark to X-rays, but was found quite healthy on examination under the anæsthetic. (Fig. 10.)

CASE 6.—Miss B., aged 43. This lady consulted me with reference to

very severe and repeated attacks of neuralgia. It had been suggested that this was a case of trigeminal neuralgia, and I was asked to examine the sinuses to exclude any trouble of this nature. The right antrum had been operated on.

On examination of the nose, no sign of sinus suppuration could be found. On transillumination, there was a good crescent on the right side, thus suggesting that the cavity did not contain granulations. By X-rays, the antrum was quite dark.

On digital examination of the cavity through the nose under an anæsthetic, the walls were found smooth and healthy.

This case is reported to show that, after a radical operation, X-rays are useless for diagnosis. We have noticed this fact in several other cases; *vide* Case 5.

CASE 7.—Mrs. C., aged 40, complained of having a cold for some weeks, which was more marked on the left side. Left-sided neuralgia and face-ache.

No pus or muco-pus could be found in the nose at the time of examination, and the patient said that the discharge was better but the neuralgia still troubled her. There was nothing obviously wrong with the teeth. On transillumination, the left antrum was dark. X-rays showed a clear antrum, but an unerupted wisdom tooth lying on its floor.

The wisdom tooth was removed by operation, and in doing so the antral cavity was opened. It was then found that the antrum contained some mucus, but was not full of it. The mucous membrane was normal, thus confirming the X-ray diagnosis.

CASE 8.—Mr. B., aged 27, consulted me for a left-sided acute otitis following on a cold a week before.

On transillumination, the left antrum was found to be quite dark. An X-ray examination on the same day showed both antra clear.

His doctor, on being communicated with, said that the antrum was an old condition, and that he had had antral symptoms previously.

It was important to find out whether in this case we were dealing with an acute exacerbation of a chronic antritis, or whether this was a genuine second acute attack with resolution between the attacks.

The latter diagnosis was made on the X-ray findings, and was confirmed a fortnight later when he was seen again with his otitis cured and with no cold. On transillumination, the antrum was found to be quite clear again.

This is a good example how the two methods were used to check and confirm one another.

CASE 9.—Mr. G., aged 42. This patient consulted me for nasal obstruction of several years' standing and constant cold-catching.

He had a marked septal deflection and two or three small polypi on each side. On transillumination, the right antrum was clear and the left dark. He was a very nervous subject, so puncture was not carried out then. By X-ray examination, in addition to a dark shadow in the area of the ethmoidal cells, the right antrum was found dark and the left fairly

light. (Fig. 8.)

At the operation, after doing a submucous resection, I punctured the right antrum but could not wash it out owing to blockage of the ostium or the cannula. Mucus was washed out of the left antrum. The left antrum had normal mucous membrane but contained some mucus. The right antrum was full of polypi.

This case shows well the contrast of X-rays and transillumination and the inference to be drawn ; it shows, too, both combinations in the same patient.



A CASE OF PARALYSIS OF THE DIAPHRAGM, PROBABLY POST-DIPHTHERITIC.

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THE occurrence of paralysis of the diaphragm is sufficiently rare to justify the publication of the following case.

On Saturday, 13th February, a woman was admitted to a medical ward in the Western Infirmary under the care of Dr. Barclay Ness, on account of a difficulty she had in swallowing.

When the case was enquired into, it was found that the difficulty was not obstructive in character, but was due to paralysis of the soft palate and constrictor muscles. Her speech had a nasal intonation, and, when she attempted to swallow fluids, a considerable proportion of the fluid returned through her nose.

She made the statement that she had had a sore throat early in January, but it had not been sufficiently serious in her opinion to call for medical advice, so the precise nature of the affection of the throat from which she then suffered is not known.

Early in February she went to a dispensary to get advice regarding huskiness and a difficulty in swallowing which she then was beginning to experience. There a bougie was passed, and after it had been withdrawn she was told that there was no obstruction present.

About 7 p.m. on the 16th February, Dr. Ness requested me to see this patient with him. He had received a message from his resident assistant at the Infirmary to the effect that the woman had suddenly experienced considerable difficulty in breathing, that she had become cyanosed, and he thought it might be necessary to have tracheotomy performed in order

to relieve her distress.

Dr. Ness and I together saw the patient within half an hour. The cyanosis by that time had passed away, and her pulse, though feeble, was regular. She was lying in bed well round on her right side, with the right half of her face buried in the pillow. Both lower limbs were drawn up, and her left thigh was fully flexed and firmly pressed against the abdomen. Her respirations appeared to be carried on by the voluntary upraising of her shoulders for each inspiration, and each effort was accompanied by contraction of the intercostal muscles. She was conscious, and, with help, she turned on to her back to have her throat examined. The change of position, together with the exertion made in getting on to her back, caused a great increase in the rapidity of her pulse, and the dyspnœa became more urgent. Further, she inclined to return to the right lateral position which she had previously occupied.

On examining the throat, the soft palate was found to be paralysed, both voluntary and reflex movements being abolished. The lower pharynx contained a considerable quantity of tenacious muco-pus, and the arytenoids and upper part of the larynx were covered with a similar secretion. The glottis was open, and both vocal cords remained fixed in the cadaveric position. The walls of the trachea were seen to be reddened, and there were patches of muco-pus here and there over the surface. She could not cough, and so was unable to clear away the accumulation of muco-pus which lay in her pharynx, larynx, and trachea.

She was evidently dying, and, as a matter of fact, did die within eight hours of our visit to her.

Two days later, a post-mortem examination was made by Dr. Haswell Wilson, who described the body as that of a slightly-built poorly-nourished woman. There was no stenosis of the larynx, trachea, or œsophagus, but the interior of the larynx and trachea, when slit open, bore evidence of acute inflammation, the mucous surfaces being deeply injected and covered with muco-pus. The bronchi were also found to be acutely inflamed. The lungs were œdematous, and in each, irregular patches of consolidation were found on section, with localized abscess formation, conditions typical of insufflation

pneumonia.

While paralysis of the diaphragm may be caused by injuries to the spinal cord, by pressure on, or injury of, the phrenic nerve, by lead poisoning, and by diphtheria, the last appears to be the most common cause. Yet while cases of diphtheria are seen by every general practitioner, few cases have been recorded in which the diaphragm has been involved in the course of post-diphtheritic paralysis. Our patient was too weak to permit of an examination of the diaphragm with X-rays, but the clinical evidence of paralysis of that structure was convincing without this method of ocular demonstration.

In this case, there was no clear history of diphtheria. But we all know that diphtheria is not infrequently first diagnosed by the onset of paralysis, particularly of the palate, the primary faucial lesion having been so mild as to escape notice.

This woman had some affection of her throat in the beginning of January, probably diphtheria, and four or five weeks later she developed symptoms of paresis of the palate, followed by symptoms which pointed to an extension of the paralytic affection to the muscles of the pharynx and larynx—the routine usually followed in cases of post-diphtheritic neuritis.

With the involvement of the nerve supply of the larynx, and consequent abolition of sensation and movement, food gained ready entrance to the air passages without exciting the reflex cough, and when the diaphragm became paralysed, neither the insufflated food nor the secretions formed within the trachea and bronchi could be expelled. Insufflation pneumonia was bound to occur, and in this case the septic process had led to the formation of numerous abscesses in both lungs.

RODENT ULCER, ITS NATURE AND SOME METHODS OF TREATMENT.

By E. GRAHAM LITTLE, M.D., F.R.C.P.

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RODENT ulcer has a peculiar interest for us, for it was first described, and in an excellent manner, by an Irish surgeon, Arthur Jacob, on the staff of Sir Peter Dun's Hospital in Dublin. In Continental literature it is still frequently designated Jacob's Ulcer, although, as I shall presently point out, most Continental writers dispute the propriety of making a special class of this disorder and so distinguishing it from other forms of epitheliomata.

Jacob's description, written in 1827, is an amazingly accurate portrayal of the clinical symptoms, and deserves to be more widely quoted in its original terms. He noted the tendency of the ulceration to "attack and destroy the eyelids and extend to the eyeball, orbit, and face. The characteristic features of this disease are the extraordinary slowness of its progress, the peculiar condition of the edges and surface of the ulcer, the comparatively inconsiderable suffering produced by it, its incurable nature except by extirpation, and its not contaminating the neighbouring lymphatic glands."

"The disease," he remarks, "may be observed under two very different conditions, either in a state of ulceration, or in a fixed state, in which no progress is made towards healing. In this latter condition the parts present the following appearances: the edges are elevated, smooth and glossy, with a serpentine outline, and are occasionally formed into a range of small tubercles or elevations. The skin in the vicinity is not thickened or discoloured. The part within the edges is, in some places, a perfectly smooth vascular secreting surface, having veins of considerable size ramifying over it—which veins occasionally give way, causing slight hæmorrhage; in

other places, the surface appears covered with florid healthy-looking granulations, firm in texture, and remaining unchanged for a great length of time."

The extraordinary slowness of the progress of ulceration and the absence of glandular invasion, noted by Jacob, constitute the chief feature of differentiation from cutaneous epitheliomata, such as the squamous-celled epitheliomata and nævocarcinomata which usually develop more rapidly, and generally behave with greater malignancy. But, as Besnier* pointed out long ago, many types of cutaneous epithelioma may terminate in rodent ulcerations indistinguishable from Jacob's ulcer. It has, therefore, long been the practice of Continental writers, and of many English writers as well, to regard rodent ulcer, Jacob's ulcer, as a clinical variety only of epithelioma; thus, the view that rodent ulcer is a non-cancerous affection, of which Paget and Hutchinson are the most important supporters, has hitherto had but a small following.

Epithelioma Adenoides Cysticum.—Numerous writers have for long approximated the disease, best known in this country as epithelioma adenoides cysticum of Brooke, to the group of nævi, and Gassmann in 1901 proposed the alternative term nævus cyst-epitheliomatosus disseminatus. Darier in his masterly exposition on epithelioma in 1904, classified this disease, as well as the types of adenoma sebaceum, under the heading epithelioma adenoides, and remarked that the view which considered these diseases as nævoid in character was well justified. On the other hand, the extreme difficulty long felt in distinguishing multiple rodent ulcer tumours from the tumours of epithelioma adenoides cysticum, and the resulting probability that these two affections are forms of the same disease, logically led to the approximation of rodent ulcer to the nævi, and this view has, in fact, been enunciated by Adamson, and developed by his assistant, McDonagh, who styles rodent ulcer "an ulcerating nævus." These writers, following Jarisch, would make ulceration the touchstone of differentiation. All the other elaborate criteria which were

* "A une certaine période de l'évolution, à la période ulcéreuse, plusieurs variétés, prises dans toutes les espèces d'épithéliome superficiel de la peau, peuvent aboutir au type clinique de Rodent Ulcer." Besnier and Doyon's edition of Kaposi, p. 651, Vol. II.

supposed to separate rodent ulcer from epithelioma adenoides cysticum have melted away, and I do not think this last bulwark can be any better defended. A test case was afforded by my patient, No. 102, shown at the Dermatological Section, and regarded by Adamson as rodent, because, as he has explained, he erroneously thought there had been ulceration, and by McDonagh as typical epithelioma adenoides cysticum. The point will be considered again in dealing with the question of multiple rodent tumours.

McDonagh, relying upon arguments largely based on the frequency with which rodent tumours appear in positions, such as the orbito-facial and naso-facial folds, where nævoid tumours generally are also frequent, regards rodent tumours, amongst others, as atavistic of the lower eyebrows and specialized skin glands found in certain mammals and absent in man. An able American critic commenting on this theory remarks with force that the tumours for which this origin is invoked, such as adenoma sebaceum, epithelioma adenoides cysticum, and rodent ulcer, have usually a much wider distribution, and in several instances reported the orbito-facial and naso-facial grooves were not involved at all.

Attempts have been made, which will be considered in greater detail later, to classify epithelial tumours according to the tissues from which they may be supposed to take origin, that is on an anatomical basis. A difficulty which besets this classification is the fact that, up to the present, there is no agreement as to the site of origin of rodent ulcer tumours; equally qualified observers have ascribed its origin to the rete, the sweat glands, the sebaceous glands, and the epithelium of the hair follicle. The last is the current favourite; but it is probably safer to follow Darier amongst others, whose view is that rodent ulcer tumours may start from the epithelium of any part of the epidermis or its appendages. In his general consideration of epithelioma, in which he includes rodent ulcer as a clinical type, Darier writes: ". . . the point of origin of the epitheliomatous proliferation was thought to exert an influence on its anatomical form and its evolution" As a matter of fact, it is almost always impossible to determine in any given case what has been the actual source of the proliferation. When this is possible, it is often evident that

several of the normal structures take part at the same time in the pathological growth. Moreover, when a single one of these seems concerned, there is no constant relation between this point of origin and the anatomical form affected by the masses of epithelial new growth." Again, in another publication on the same subject, he writes: "Histology is not able to determine where and when the malignant proliferation begins."

These, however, are theoretical considerations of still dubious authority, and I now pass on to clinical features of the disease for which there is more evidence. Whether rodent ulcer be regarded as definitely entering the group of epitheliomata or not, there is no doubt about the importance of early treatment, inasmuch as the most formidable destruction of tissue may take place in untreated conditions. Jacob noted this fact. "When ulceration commences," he writes, "it proceeds slowly, cutting away all parts indiscriminately which may be in the direction in which it spreads." "When the disease extends to the bones they sometimes exfoliate in scales of small size, but more generally they are destroyed, as are the soft parts, by an ulcerative process." The character of the treatment is of great importance, for much damage may be done by faint-hearted interference which may have the effect of hastening, and not retarding the ulceration. "I have indeed observed," says Jacob, "that one of those cases which is completely neglected and left without any other dressing than a piece of rag, is slower in its progress than another which has had all the resources of surgery exhausted upon it. The success even of powerful escharotics is doubtful, and from the experience I have had in those cases I am inclined to conclude that it bids defiance to all remedies short of extirpation." These considerations will be dealt with more in detail when we come to describe methods of treatment.

The remarks which follow are chiefly based on an analysis of a series of hospital and private cases, numbering together 127, under my own observation during the past 12 years. These are tabulated at the end of the paper. The whole number of skin cases thus laid under contribution is 28,000. The ratio of rodent ulcerations to other cases of skin disease in hospital practice proved to be 3·5 per mil., and in private practice 12·5

per mil. Cases, which occurred on mucous membranes and in circumstances which might cause question of their nature, are separated and tabulated independently ; but as I have, I hope, made clear, I would not hesitate personally to describe as rodent any ulceration that included the clinical features, which, in my opinion, ought to prove a sufficient reason for the appellation, regardless of the supposed origin of the tumour. Thus, I do not at all agree with the view that epithelial tumours preceded by injury, such as solar burn or trauma, should, *ipso facto*, be relegated to another category. Dubreuilh, who perhaps has accepted more completely than most Continental writers the English view of rodent ulcer, would exclude from this category cases beginning with senile keratosis, the condition described by Unna as "Seaman's Skin." My own view is opposed to Dubreuilh's ; indeed, I have had so many instances of perfectly typical rodent occurring in patients, who have had independent lesions of senile keratosis, that I should ascribe to this condition a direct association with rodent, and possibly both rodent and senile keratosis are expressions to some degree of a common underlying cause. Instances of this association abound in the appended table of cases.

The list includes three cases of multiple tumours, which I have previously reported as epithelioma adenoides cysticum, but there seems now no valid reason for making a separate classification for these, and they may be regarded as instances of rodent tumours of rather a specialized clinical type.

DEFINITION OF RODENT ULCER.

We may take it that the preponderance of opinion is largely in favour of regarding rodent ulcer as a clinical form of epithelioma. With recent methods of treatment, when excision is comparatively seldom resorted to, histological evidence as to the origin and nature of the growth is not often obtainable, and criteria of differentiation from other forms of epithelioma must therefore be chiefly clinical. It is useless to offer differentiating tests which involve the decision of the microscope, such as the otherwise excellent suggestion of Payne's, which has the authority of an admirable observer who combined in an unique degree the accomplishments of a general pathologist with those of a dermatologist. The distinction

offered by Payne was "that squamous epithelioma arises from that portion of the epidermis which is endowed with the power of forming horny scales, and rodent ulcer originates in that portion which either has formed or is capable of forming the appendages."

If we are to keep rodent ulcer as a group at all, separate from epithelioma, and Colcott Fox has commented on the singularity of the fact that Continental writers have shown little tendency to adopt the English view, I believe we must find some clinical formula to embrace the clinical manifestations by which the disease is distinguishable. Norman Walker says, with accents of disapproval, that to many surgeons, but to few pathologists, all slowly-growing cancers of the skin are still rodent ulcers. He himself regards rodent ulcer as a glandular carcinoma originating from the sweat glands, a view based upon microscopical evidence in which he in turn is supported by "few pathologists."

It is important to keep in mind that the term "rodent ulcer" is applicable to the non-ulcerated tumour which often precedes ulceration by several years, and which was not observed by Jacob with any particularity. This initial tumour is usually described by patients as a pimple or wart, and in a series of 55 cases, described by Bowlby as rodent ulcer, this mode of origin was noted in no less than 44 instances. I would therefore offer the following summary of the most characteristic factors in diagnosis. Rodent ulcer is a clinical term applied to a slowly-growing epidermal tumour, showing tendency to ulceration, without causing enlargement of the lymphatic glands in anatomical continuity with the site affected. The disease may first be seen when ulceration has occurred, in which event the usual history is that of a preceding wart or pimple. In most cases, the lesions are single and situated upon the face, but they may occur on any part of the body. Recurrences, either *in situ*, near the original lesion, or remote from it, are frequent, no matter what treatment may have been adopted, and very serious local destruction may take place, but still without deeper invasion of the tissues. The disease is thus very seldom fatal in itself, patients usually dying of an intercurrent affection.

The initial tumour is usually a rounded excrescence,

of waxy translucence, often with an edge which appears to be made up of semi-independent granulations (mamillated) and surrounds a slightly depressed, sometimes umbilicated centre. Dilated vessels are frequently conspicuous, running over the edge for the most part. The tumour may last very many years, and attain a great size without ulceration. Bowlby has reported cases in which one was as large as a Tangerine orange, another as large as a fig, and another as large as a hazel-nut. Individual nodules may persist unulcerated for 16 years, as reported by Bowlby, for 15 years, as in a case under my own observation, but the average time is, as a rule, from three to five years.

The initial tumour, too, may be quite indistinguishable from a wart, and I have seen cases in which the waxy tumour and the warty tumour co-existed. More exceptionally, typical rodent ulcerations may develop upon congenital moles in scars, especially on old syphilitic lesions, and in the warty patches described by Besnier as "*épithéliome sébacé*." Gray reported a rodent ulcer of the buttock, and Whitfield on the shoulder, appearing on a patch of old psoriasis.

Very exceptionally, the initial lesion may be in the form of a circumscribed, indurated plaque, feeling like a thin flake of cartilage inserted in the skin. In one case, reported by Crocker, the indurated patch was yellow, and, subsequent development leading to excision, the condition was demonstrated to be typically rodent. I believe I have seen three cases of this kind, all on the cheek and in elderly patients. In each instance, there was a chronic history, and no glandular involvement. I have seen similar plaques on the lip.

When ulceration is early, and the area covered is small, there is usually an exceedingly typical combination of a prominent edge enclosing a shallow ulcer, which bleeds very readily on friction. The ulceration may remain superficial and extend to cover a very large area, or it may be small in extent but deep. In cases improperly treated, especially with inadequate caustics, the natural destruction may be hastened, and the most formidable mutilation may in this way result. A case of this kind, which I saw very early in my career, some 16 years ago, occurred in an old

army officer, in whom both eyes, the nose, upper maxilla and cheeks had been eroded, so that in the middle of the face there was a chasm in which one could have put a foetal head, the floor being formed by the bony orbits and the pharynx. In this cavity a foetid discharge would collect. The patient lingered in this condition for several years, and ultimately died of a septic pneumonia. The disease had commenced 30 years before I saw him, with a wart on the nose, and he had been treated with a variety of caustics. I do not think we see cases with such extensive destruction nowadays, probably because with a wider choice of treatment, and especially with an alternative to operative measures, patients more readily undergo treatment and seek it earlier. If one examines Bowlby's series, one is struck with the number of instances in which large portions of the face had been eroded.

Very exceptionally cystic dilatations may stud the surface of primary rodent indurations, which may remain un-ulcerated, or ulcerated only in a few isolated places. I saw one such case (No. 5), a large patch, about two inches by three, on the back of a man of 42, the whole surface being covered with translucent granular-looking elevations, which when pricked emitted fluid. Histological examination of a portion of the patch showed a cystic rodent. Similar cases have been reported by others; but they remain a very rare type in primary forms of rodent.

Multiple rodent lesions are not very uncommon, and when they are in large number, running above 20 for instance, there is always the possibility of differences of opinion as to their classification with rodent or with epithelioma adenoides cysticum. I have commented on the difficulty of establishing any reliable means of differentiation between these two types. Presence or absence of ulceration is not diagnostic, for we have seen that rodents may persist in tumour stage without ulceration for 16 years or longer, and epithelioma adenoides cysticum tumours may ulcerate. Sutton describes two such cases, one as rodent, one as epithelioma adenoides cysticum. The elder patient had a large number of lesions, over 70 in fact, distributed in the usual position for that disease, that is, on the face and back. These had commenced to appear at the age of

15 ; there had been no ulceration in any of these for a period which is not definitely stated, but must have been considerably over 20 years, and the histological sections are stated to have shown typical epithelioma adenoides cysticum. Much later in life, somewhere about the age of 40, a new cystic tumour developed in the inner canthus of the eye, which ulcerated within a year of its appearance, and was clinically indistinguishable from rodent, and the ulcer proved very intractable and steadily increased in size. Another similar instance is also reported by the same author in the daughter of the patient just described, in whom a number of nodules, over 60 altogether, were present on the forehead, face, and neck, none of them larger than a grain of wheat, except in one instance in which a lesion on the right side of the neck enlarged and ulcerated, and formed a "typical rodent ulcer." Three of the nodules were examined, and showed histological appearances of "typical rodent ulcer."

Others besides myself contend that there are no criteria of differentiation, histologically, between epithelioma adenoides cysticum and rodent ulcer, so that too much reliance cannot be placed on the microscopical evidence, and certain clinical facts are more convincing, especially early appearance and inheritance. Inheritance is moderately rare in rodent ulcer ; Bowlby expressly disclaimed any instance in his 66 cases. Spencer emphasized its rarity as a means of distinction between rodent and epithelioma, and it was for long one of the chief differentiations between rodent and epithelioma adenoides cysticum. The weight of probability to my mind is in favour of regarding both of these cases of Sutton's as examples of epithelioma adenoides cysticum, if that is to be still regarded as a separate entity, and in both of these ulceration occurred after a lapse of years. Cases of multiple rodent ulceration present the greatest difficulties of classification, and there is practically no agreement on any basis of distinction at the present time. In these circumstances, it seems to me to be of paramount importance to restore to English medicine, which has always been famed for its accurate clinical descriptions of disease, a conception of rodent ulcer based on facts of clinical observation rather than on microscopical minutiae, which have really obscured rather than illumined the modern

descriptions.

It is instructive to contrast the solidity of the structure reared by Jacob on clinical observation, a structure which, after nearly a century has expired, still stands in its essential feature "foursquare to all the winds that blow," with the results of the debate on rodent ulcer at the Pathological Society only 21 years ago. A number of eminent surgeons and dermatologists took part in that debate, and congratulated themselves at the end of it that, at least, they had agreed that "rodent ulcer was a glandular carcinoma," although the widest possible divergence of views was apparent as to what glands it originated from. I believe that a service to clearness of thought may be done by reverting to the conception of rodent ulcer as a clinical rather than pathological entity, and that if we hold fast to the idea of the disease first clearly pictured by Jacob, we shall help to replace a very useful clinical grouping, which is in danger of being submerged by too much ill-digested pathological detail.

Rodent ulceration, then, may be regarded as a terminal ulceration of very slow progression, and without metastatic invasions, which may originate in a great variety of ways, of which the following may be particularized:—

- (1) Most commonly as a waxy papule or nodule ;
- (2) As a non-pigmented warty growth ;
- (3) As a pigmented mole ;
- (4) As a senile change by which areas of skin may become warty and often pigmented (Seaman's skin of Unna) ;
- (5) As an epitheliomatous growth in damaged tissue ;
- (6) As a circumscribed indurated patch with or without pigmentation, usually in elderly persons ;
- (7) The senile pigmented wart, too, which differs from the last category, may, but I think exceptionally, be followed by rodent ulceration.

Probably some cutaneous affections of very chronic type may be predisposing causes as well, and psoriasis has been in at least two cases thus followed by rodent. The epithelioma, which is not an infrequent sequel both of lupus erythematosus and lupus vulgaris, has some clinical features in common with rodent. It is much more rapid in extension as a

rule, but it is singularly non-malignant in that it seldom causes glandular invasions, and, in my own experience, recurrence after excision, which in view of its rapid local spread is the best treatment, is even less common than recurrence of rodent after operation.

Distribution.—The distribution of the early lesion is curiously constant, and in a great majority of instances is limited to the upper half of the face, with special predilection for the neighbourhood of the eyes and nose. In 32 of Paul's 33 cases, in 62 of Bowlby's 66 cases, the lesions were limited to the face. If, however, the cases of epithelioma adenoides are to be included provisionally, as I think they ought to be, in this class, the whole area of the face, the neck, and the upper part of the chest are frequently the site of eruption. But characteristic rodent ulceration may occur exceptionally in almost any part of the integument. Some of the most unusual of these positions may be mentioned.

EXTRAFACIAL RODENT ULCERS.

This list is compiled almost entirely from English sources, for it is not easy always to apprehend what Continental writers mean by the term when they make any separate classification from other epitheliomata, which is infrequent. I have excluded all cases of the clinical type of epithelioma adenoides cysticum; if these were included the number of extrafacial instances would be much increased. Cases from my personal series are numbered according to their position in the table annexed to this paper. The list is not in any sense exhaustive, but may serve to give some idea of the relative frequency of extrafacial lesions.

1. *Scalp*.—Single cases reported by Parker, Mackenzie, Stowers, Fox.
2. *Nape of neck*.—Personal cases, Nos. 4, 29, 83, 86, 91, 109. Single cases reported by Crocker, Mackenzie, Paul, Bowlby.
3. *Pinna of ear*.—Personal cases, Nos. 69, 78, 94. Single case reported by Beadles, two cases by Bowlby.
4. *Mastoid eminence*.—Personal cases, Nos. 36, 110.
5. *Back of trunk*.—Personal case, No. 5. Single cases reported by Crocker, Pringle, Mackenzie, McIntire, Whitfield, two cases by Bowlby.
6. *Sacrum*.—Single cases reported by Crocker, Gray.
7. *Sternum*.—Single cases reported by Colcott Fox, Sheild.
8. *Umbilicus*.—Single case reported by Rolleston.

9. *Male breast*.—Single case reported by Betham Robinson.
10. *Arm*.—Personal case, No. 49. Single cases reported by McMurray, Mackenzie.
11. *Wrist*.—Personal case, No. 44.
12. *Dorsum of hand*.—Personal cases, Nos. 3 and 34. Single case reported by Crocker, Sheild.
13. *Groin*.—Single cases reported by Crocker, Hutchinson, Pigg.
14. *Scrotum*.—Single case reported by Sheild.
15. *Thigh*.—Personal case, No. 96. Single case reported by Bidwell.
16. *Dorsum of foot*.—Personal case, No. 89. Single case reported by Sheild.

G. L. Cheatle has suggested that there is an association between the distribution of rodent ulcers and Head's areas, a suggestion which has not received much support. It is a moot point whether rodent ulcers may occur on the mucous membrane of the lips. Many authorities would refuse to class ulcers in these positions with rodent, but there is no doubt in my mind that the clinical features of very slow ulceration, and absence of glandular involvement or metastases, may co-exist with ulcers in these positions; when these clinical features are found in combination, the term is, in my opinion, applicable.

Sex Incidence.—English statistics here, too, are also to be preferred to Continental, owing to the difficulty of appreciating Continental classifications. For example, Dubreuilh excludes from classification all cases which begin with trauma, with the anomalous result that of 166 cases reported by him as rodent ulcer, 108 occurred in women, and only 56 in men, *i.e.*, nearly twice as often in women. Directly the opposite conclusion can be drawn from Bowlby's figures, in which of 66 cases 40 were men and 26 women. Butlin reported a series of 210 cases, of which 120 were male and 90 female. Crocker, analysing 75 personal cases, found 42 males and 33 females. In 27 cases reported by Roger Williams, 14 were men and 13 women. In my own present series of 115 cases, excluding lesions of the lips, the proportion is 61 males to 54 females.

Age Incidence.—The following is an analysis of the ages of my series and a series of 166 cases reported by Dubreuilh, set out in quinquennia, the age representing not the time at which the disease was first noted, but the age when the patient came first under observation.

In both of these series the average age is considerably

higher than that frequently stated to be usual, viz., round about 40. The youngest age of onset in my series was 20, and this was in a patient with symptoms preponderating to the diagnosis of epithelioma adenoides cysticum. The oldest age of onset was 81.

Age.						Personal Cases.	Dubreuilh's Cases.
26 to 30	-	-	-	-	-	4	1
31 to 35	-	-	-	-	-	None	4
36 to 40	-	-	-	-	-	6	12
41 to 45	-	-	-	-	-	17	17
46 to 50	-	-	-	-	-	16	17
51 to 55	-	-	-	-	-	11	26
56 to 60	-	-	-	-	-	16	14
61 to 65	-	-	-	-	-	21	25
66 to 70	-	-	-	-	-	15	22
71 to 75	-	-	-	-	-	6	15
76 to 80	-	-	-	-	-	1	8
81 to 85	-	-	-	-	-	1	3
86 to 90	-	-	-	-	-	None	2

Occupation and Station of Patients.—All observers are agreed that rodent ulcer is much commoner in private than in hospital practice; that is in the well-to-do. In my own statistics, it was nearly four times as frequent in private as compared with hospital patients, and there was a marked preponderance of men as compared with women; my figures in this respect are as five to three, a proportion which, as it happens, is exactly the same as that quoted by Crocker.

MALIGNANCY.

Various explanations have been offered of the benignity of rodent ulcer as compared with squamous-celled epithelioma. These rest chiefly on views as to its origin based on microscopical data, but, as we have seen, such data have been singularly divergent. A common denominator was sought, and is expressed in the definition of Payne, quoted above, and in a classification which groups rodent

ulcer under the general term of tumours derived from the basal cells of the epidermis. It is an old observation that the cells, constituting the epithelial portion of the rodent masses, are smaller than the cells of the epithelial masses in squamous-celled epithelioma, have lost their prickles, and do not undergo keratinization. Attempts have been made to connect malignancy with the character of the cells from which the tumour originates, the more embryonic the type, the more malignant the tumour derived from it. This explanation assumes that tumours always breed true, *i.e.*, that they consistently keep the same type of cell as that from which they originate. This assumption is expressly supported by some, but as vigorously denied by others. It is certainly to be expected that growths from the more embryonic basal layer should be more malignant than growths from the more mature prickle cells. I should like here to quote what seems to me a most pregnant summing up of the difficulties and fallacies, which underlie these assumptions, from the important contribution to the classification of the epitheliomata made by Darier at the Fifth International Dermatological Congress. He says:—

“The greater or less degree of malignancy of a neoplasm has no doubt a great practical importance, but as this quality is not easy to define with precision, is susceptible of variation in the course of evolution of the same tumour, and is not necessarily bound up with any particularity of structure, it cannot enter into consideration in any nosological classification. Special classes are not made in botany for poisonous plants, or in zoology for venomous or fearsome animals. . . . When one demands of microscopical analysis to indicate with precision the exact origin of proliferation, on the supposition that an epithelioma derived from the superficial epidermis must differ from a tumour originating from a hair follicle, a sebaceous or a sudoriparous gland, one is on the wrong track. This originating source is in the majority of cases impossible to determine, is often multiple, and it is moreover established that very different tumours may originate from the same source.”

Attention has been directed so largely to the epithelial factor in determining malignancy, that it seems to me that some

neglect has overtaken the factor of at least equal importance, the connective tissue stroma which is especially rich in rodent ulcer. Malignancy is at least as likely to be conditioned by the protective isolation afforded by dense stroma as by the character of epithelial cells, to which so much importance has been ascribed.

The abundance of the fibrous stroma is one of the most characteristic features in the histology of rodent ulcer. The power of producing excessive fibrous proliferation in response to injury, the fibropoietic factor as I venture to call it, is in all probability an inherent quality in some individuals, and is best studied in the disease known as keloid. I believe this quality may be inherited, but it may be acquired as well, which was apparently the inference in a remarkable case shown at the Dermatological Society of Great Britain by my friend, Mr. Arthur Shillitoe, who was good enough to give me some tissue for histological examination. The patient was a man of about 45, the subject of a very extensive eruption of syphilis of rupial type. In well over one hundred of the sites of these lesions the patient subsequently developed growths, proved to be keloid by microscopical examination. This man, in earlier life, had been twice vaccinated, and showed well marked scars, but had never had any keloid growth in these. The inference to be drawn from these facts was that this idiosyncrasy was a later development, possibly conditioned by the intercurrent syphilis. Now it seems to me probable that there is some such fibro-poietic idiosyncrasy in the case of persons who acquire rodent ulcer, whether as the result of protective efforts or of pathological factors we need not stop to enquire, for this activity is undoubtedly of value to the patient. This hypothesis, I think, throws some light on the effects of treatment; agencies which are fibrolytic are, on the whole, likely to increase the rapidity of malignant ulceration by sweeping away the breakwaters afforded by the fibrous trabeculae which isolate the cell masses, restrict their growth, and prevent their dissemination. I have seen the most rapid extension of ulceration take place, after applications of radium, in three cases of rodent ulcerations which were previously quiescent, and the fibrolytic action of radium is well established by

its effect in reducing hypertrophic scar tissue and keloid.

Consideration of the frequency and rapidity of return of so many excised rodents, as seen in the Middlesex Hospital figures quoted by Roger Williams and in Butlin's statistics, seems to me to indicate that the indiscriminating knife by shearing away the protective barrier of fibrous tissue has hastened the activity of ulceration. Agencies, if they exist, which will spare the fibrous good angel and eliminate the bad angel of proliferating epithelium, are certainly *a priori* to be preferred. Claims for possessing selective action in this sense are made for X-rays, for freezing, for ionization, and for radium by their respective advocates, and it is apparent that the physicists have not as yet demonstrated the molecular as distinguished from the molar effects of these physical methods.

I have hinted at the possibility of a special idiosyncrasy of fibropoiesis. I am inclined as well to regard it as likely that there is a special anaphylaxis, as it were, by which persons developing rodent ulcer tumours tend to produce these with increased frequency. It is this factor, I think, which explains the very frequent experience of so-called recurrence, which is often new formation sufficiently near the old site to allow of confusion, but just as often far removed and separated by very appreciable intervals of time. Epitheliomatosis may be a convenient term to indicate this tendency, which obviously may be inherited, to form epitheliomata.

Before making the detailed analysis of my own experience, which this paper has entailed, I should have agreed with the statement generally accepted as to the rarity of inheritance in rodent ulcerations, compared with other forms of epitheliomata. I am now persuaded to the contrary, and have, indeed, been struck of late with the frequency with which one gets a history of hereditary transmission. When one considers the reluctance with which patients, especially of the hospital class, own to cancerous antecedents, the ratio of positive findings is the more significant. The family history of 23 patients suffering from rodent ulcer, was investigated specially by Roger Williams with the result that in four cases there was a positive history of cancer, a father, a maternal grandmother, a maternal aunt, and a sister having

suffered from cancer or rodent ulcer ; in three other cases, there was a history of a mother, and a niece dying of "abdominal tumour," and a sister dying of an "internal tumour."

In taking leave of this part of our consideration, in which histological arguments have played the leading part, I wish again to emphasize my belief that rodent ulcer is not essentially "a distinct and easily recognized microscopical entity" (Walker). It is this conception of it which has wrought confusion, and we seem to have parted with the possibly old-fashioned but still reliable mariner's compass of clinical observation, without having provided any equally reliable substitute. That unsurpassed clinical observer, Colcott Fox, wrote in 1894: "My own experience shows that there is a striking similarity in all the growths diagnosed clinically as rodent ulcer. The apparent differences in the pattern of the growth (acinous, tubular, etc.), are apparently due to the relative degree of branching and anastomosis of the processes and their luxuriance of growth, to the amount of connective tissue thus isolated, to the amount of inflammatory tissue surrounding them and to the resistance afforded by the tissues."

Whether there will ultimately be demonstrated a constant histological picture corresponding with the clinical facts, sufficiently definite and constant to justify from the microscopical standpoint the formation of a group of disease, remains to be seen.

METHODS OF TREATMENT.

It is no exaggeration to say, that until the end of last century there had been no improvement and very little change in the methods of treating rodent ulcer, compared with the directions given by Jacob in his original memoir quoted earlier. Indeed, there are many authorities, especially among operating surgeons, who would still endorse his opinion that "it bids defiance to all remedies short of extirpation."

But as rodent ulcer chiefly affects the face, and especially conspicuous parts of that, such as the nose and eyelids, it is not surprising that patients have exhibited a certain coyness in submitting to surgery. It is the experience of all of us that when there has been very little option but the knife, patients

often preferred to the certain mutilation threatened by the surgeon the less easily apprehended, because less easily visualized, destruction by the disease, which was consequently allowed to take its course with frequently disastrous results. The undoubted diminution in the number of hideously disfiguring rodent ulcerations which has been perceptible in the last 15 years, must be ascribed to the fact that within that time alternative means have been at the disposal of the patient, and have been accepted by him when operation would have been refused.

EXCISION.

As excision is the oldest of the procedures we have to consider, we will take it first. A very instructive series of cases, treated by excision alone, was reported in 1888, ten years before the newer practices became feasible. They had occurred in the practice of the Middlesex Hospital, which has long enjoyed a special reputation for the treatment of malignant diseases. In 11 cases in which the primary growth was treated by excision and the history was followed up, recurrence took place in all, after the following intervals:—In three cases within a few weeks; and in the remaining eight after 2 months, 4 months, 12 months, 14 months, 18 months, 20 months, 2 years, and 5½ years respectively.

Excisions performed for the recurrent ulcer were even more disastrous. Of 14 such cases, one died of phthisis 67 days after operation, and in the remaining 13 a second recurrence took place at the following intervals after operation:

1. A few weeks after; 2. Two months; 3. Six months; 4. A few months;
5. A few weeks; 6. One year; 7. Six months; 8. Six months; 9. One month; 10. One year; 11. Two years; 12. Two-and-a-half years; 13. Six months.

If it be objected that it is not fair to compare the results of surgery of 27 years ago with those of present day treatments other than surgical, I would answer that it would be difficult now to gather the same number of cases, recorded equally faithfully, which had had no other treatment than surgical. The series represents some of the best surgery of a period almost right up to the date of introduction of other methods. It will not, I think, be contended that the surgeons

of not quite a generation ago were any less skilful, or any less imbued with the necessity of dealing drastically with epithelioma, than those of the present day. A distinguished surgeon has, in fact, expressed the opinion to me that the results of surgical intervention to-day in rodent ulcer if presented in statistics of recurrence, would certainly be even more formidable than those of 1888; because at the present time practically only the worst and most hopeless cases of rodent get to the surgeon, usually after other methods have failed disastrously, whereas the series of 1888 represents all kinds of rodents, small and early, as well as large and erosive, and therefore offers really a much fairer comparison than it would seem at first sight to be.

The principal improvements of the surgical art in the last 27 years, the wider application of aseptic precautions, and the better use of anæsthetics, might and would influence the mortality of operations, but would hardly, it seems to me, affect the ratio of recurrence of rodent ulcers after operation. Butlin, in 1900, gave the ratio of presumed cures as one-third, but did not carry his observation beyond three years after operation. Consideration of this appalling record lends point to Jacob's shrewd observation about one of his cases, which, he says, "though completely neglected, showed a slower progress than another which had all the resources of surgery exhausted upon it." The operating surgeon in our time has annexed so many provinces of non-operative medicine, that it is only fair that he should in turn give up a small part of his own previous domain; for I submit that the results I am about to tabulate, achieved with methods chiefly non-surgical, will compare favourably with the series I have just quoted.

The methods other than excision, which are available in the treatment of rodent ulceration, in which the two cardinal symptoms of slow progress and absence of glandular invasion are demonstrable may be summarized as follows:—

ESCHAROTICS.

These have been highly praised by very competent authorities, but I have had little personal experience of their use. In the series of cases reported by Roger Williams from

the Middlesex Hospital, in eight cases in which caustics, not otherwise identified, were used for primary rodent lesions, and in which the cases were followed up, recurrence took place in all after the following intervals :—

In three, "shortly after"; after two months; after one year; after two years; after four years; after several years.

In a recent case of my own series, No. 96, the general practitioner in charge of the case reports a marked improvement with the application of an arsenical paste, not of my ordering. On the other hand, I believe from the histories I have had from patients, that ulcerations have been rendered worse by caustic treatment, which, consequently, I have never used personally.

X-RAY TREATMENT.

This method was first tried in the opening years of this century, and early examples of application with success are reported in the *British Journal of Dermatology* in 1900 (Stenbeck), 1901 and 1902 (Sequeira), and 1903 and 1904 (Little). In 1908, Sequeira reported on 181 cases treated by X-rays in the following terms :—

Cured for more than three years, 75; cured for at least two years, 26; relapses, ultimately healed, 31; relapses, never healed, 4; improved, but never quite healed, 19; very little influenced, 16; spread in spite of treatment with X-rays, 7.

Treatment by X-rays is still the method of election with many excellent authorities, and as it is the oldest of what may be called the physical methods, it is possible to produce cases which have remained cured for longer periods than the later discovery of the other methods allows of. Thus I saw a few days ago a patient who had been under me and treated with X-rays in 1904, and remains perfectly well. But the method was very tedious; this patient had had 95 applications. I am not personally convinced that recurrences are less frequent than with the two methods which I shall describe immediately, though this statement has been made, I believe on insufficient evidence. Moreover, I am always uneasy as to possible

ill-effects on deeper tissues, for it seems to me idle to ignore the certainty that the rays penetrate much deeper than is actually required to produce the effect we desire, and their action on deeper structures cannot be nil, and is as yet unknown. That the serious ill-effects of X-rays may be postponed, but yet eventually come about, was strikingly shown in a case of an X-ray operator, exhibited a few months ago at the Dermatological Section, who had worked with the rays eleven years previously, but had not used a tube in that interval, and after that long lapse of time began to show malignant changes on the hands, which could only be ascribed to the earlier handling of X-rays, which had produced no apparent immediate effect.

IONIZATION.

This method was introduced about six years later than X-rays, and sufficient time has elapsed to allow some comparison of ultimate effects with other methods. It is much less practised and less well-known than radiotherapeutic measures, but is, in my opinion, a very useful and reliable means. It has what seems to me the great advantage of not offering any possibility of damaging deeper tissues, for the degree of penetration is moderate and well ascertainable. It is within the reach of every medical man who possesses a galvanic battery or other source of current, and in the celerity of its action compares favourably with X-rays. It has the disadvantage of being somewhat painful, but the pain can be greatly minimized by careful manipulation, or even by local anæsthesia. Its chief drawback in out-patient practice is the time it requires compared with freezing. Where ionization takes minutes, the other procedure takes seconds, and this saving of time is an important consideration in the running of a large department.

Cases 3, 25, 39 in my series present notable examples of results with this method.

ACTUAL CAUTERY.

This method has recently been used a good deal and recommended by Parisian dermatologists. I have had no experience personally with it, but a French practitioner obligingly demon-

strated the special apparatus used in a single case of mine, No. 28. Two applications resulted in the complete healing of a rodent, the size of a sixpence, on the nose, and this patient shows no recurrence six years after treatment. But the scar is somewhat deep and unsightly, whilst the process of cauterization was distinctly terrifying to the patient, so that it does not seem to offer advantages over other methods to be described.

FREEZING BY CARBON DIOXIDE.

I believe I was one of the earliest to utilize this method ; my first cases occurred in July, 1910, and I reported some of these in the *British Medical Journal* of January, 1911. Since that date I have used the method constantly, and am satisfied that it is a valuable addition to our resources. Its advantage, to my mind, is the certainty that one is not doing any damage to adjacent and deeper tissues, a conviction which cannot be held in the case of X-rays or radium. Its practical convenience is great, the shortness of application required makes it adaptable to the routine of an out-patient room, and its comparative painlessness gives it preference over the method of ionization. I am persuaded that some who have decried its use have not given it a fair trial. One of the minor drawbacks of its employment is that the immediate effect of one application is often so striking that the patient, especially if of the hospital class, takes it upon himself to pronounce himself cured, and does not attend again ; in several of my own cases, this was the explanation of recurrence.

My own practice, in all cases of rodent ulcer, is to warn the patient that recurrences with every form of treatment may occur, and I have kept in touch with my cases by a periodical overhauling of the sites treated. My hospital patients with rodent ulcer are enjoined to report themselves to me every three months, and to notify any change of address, of which a record is kept in my department. Commonly, about four applications are required, the average duration of contact with the snow being from 20 to 30 seconds, very rarely longer. It is better, in my experience, to give short applications and repeat them, than to give exposures of 40 seconds or more, as advocated by some.

"Primum, non nocere," is a maxim especially to be kept in mind in dealing with rodent ulcer, and I have never seen the vicious accentuation of the ulcerative process take place with this method, as it does with others. An enormous advantage is that it is at the disposal of every general practitioner who can obtain a cylinder of carbon dioxide, and the cost of the treatment is infinitesimal. The operator must himself be convinced that no rodent tissue is left, before he allows the patient to cease attendance.

RADIUM.

My personal experience with this method has not been entirely favourable. Much the same objections are to be made as in the case of X-rays, as regards the uncertainty of ultimate effects and the influence of the deeper rays on the underlying and adjacent tissues. (See Case No. 99, in which permanent injury to the eye seemed to result.) The prolonged applications required and the prohibitive cost are very serious drawbacks to its general employment.

In a certain number of instances, notably in cases 11, 17, 96, the application of radium apparently created a most formidable and rapid breaking down of tissue, and converted a small ulcer into a huge excavation.

This colliquative effect of radium is admitted in the current report of the Radium Institute in the following terms:—"Many of those ulcers which have received treatment extending over a period of many years with X-rays, zinc ionization, carbon dioxide, etc., respond badly to radium treatment, and it is unwise to attempt to make any pronouncement as to the probable result. *Quite frequently the previously treated tissues break down to an extent which far exceeds the existing ulceration, and repair is very slow and imperfect.*" (The italics are mine.)

In the table which follows, cases are roughly arranged in the order in which they occurred, beginning with the year 1902, when I took charge of the skin department at St. Mary's Hospital. Many gaps in information, due to imperfect note-taking on the part of clinical clerks, remain unfilled, and those familiar with hospital practice will not be surprised at the frequent impossibility of following up cases.

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TABLE OF AUTHOR'S CASES.

No. of Case.	Name.	Age.	Sex.	Occupation.	Type of Lesion.	Duration.	Distribution.	Treatment.	Subsequent History, and General Observations.
1	Edward W.	60	M.	Army Officer.	Nodule	30 years	Bridge of nose.	"Caustics." Nature unknown.	Nodule ulcerated, and finally ulceration destroyed both eyes, nasal bones and upper maxilla. Patient died ultimately of septic pneumonia.
2	Maurice C.	65	M.	Barrister	Senile keratosis, with multiple keratomata.	10 years	Nose and cheek.	Galvanic and actual cautery.	Seen by Besnier and Danier who diagnosed "épithéliome sébacé" with subsequent rodent ulceration, which is reported to have healed.
3	Edward D.	48	M.	Civil Servant.	Pigmented warty patch.	28 years	Warty growth pigmented, under L. eye. Senile keratoma L. ear.	Ionization, zinc and magnesium; two applications.	Warty growth on cheek completely disappeared. Recurrence or fresh growth reported to have taken place five years later, <i>i.e.</i> , 18 months ago. Not seen again. Lesion on ear, not treated, remains <i>in statu quo</i> .
4	Henry F.	45	M.	Clergyman.	Ulcer	2-3 years	Back of neck	Treatment declined.	Subsequent history unknown. Seen once only.
5	Henry S.	48	M.	Solicitor	Ulcer 3" x 2" with small cysts.	"Several years."	On back of trunk between scapulae.	Salicylic acid plasters.	Microscopical examination indicated cystic rodent tumour. Seen only once in 1906. Complete involution reported in centre with good scar. Some extension at margins. Refuses other treatment. (Report 1915.)
6	Emily M.	60	F.	Married	Ulcer	Uncertain	Lower eyelid	X-rays (18 months); failed to cure. Excision.	Attended irregularly owing to distance. Ulcer spread under X-ray treatment. Excision of entire eyelid then performed. Remains well, no recurrence, nine years after. (Report 1915.)
7	Martha M.	50	F.	Married	Ulcer in site of mole.	8 years	R. cheek	Excision. X-rays.	Mole increased in size and became painful: excised; recurrence, again excised three years later. Second recurrence treated with X-rays. After 70 exposures seemed cured. Recurred six months later. Sequel unknown. Patient had had breast removed for "cancer." Father died of "cancer."

8	John G.	69	M.	Baker	Ulcer	—	Face	X-rays	Lost sight of.
9	Wm. C.	62	M.	Riveter	Ulcer	2 years	R. cheek under eye.	X-rays	After 89 exposures, ulcer seemed cured. No recurrence, and remains well, 12 years after. Report 1915—Scar hardly seen.
10	Mary C.	61	F.	Married	Ulcer in site of of mole.	15 years	R. temple	Excision	Lost sight of.
11	Margaret L.	64	F.	Married	Ulcer in site of pigmented mole.	9 years	Above L. eyebrow.	X-rays. Excision. Ionization. Freezing. Radium.	Began as small ulcer. Healed several times in last 12 years that she has been under observation. Always recurred. Various treatments tried, the last being radium (nine months duration) which seemed to cause great destruction. Whole orbit ultimately involved. Seen 1915.
12	Annie Y.	45	F.	Married	Multiple ulcers and nodule.	—	Cheek. R. side tip of nose infraorbital L. side.	X-ray	Eight years previously had rodent of R. cheek, which got well with 19 exposures of X-rays. New nodule came on nose two years after, which disappeared with nine X-ray treatments. Still later new nodule appeared on L. cheek five years ago.
13	Grace T.	37	F.	Cook	Ulcer, began in pigmented mole.	—	Face	Excision	History subsequent to operation unknown.
14	Jane D.	65	F.	Laundress	Ulcer	—	Outer side of orbit.	Refused treatment.	Lost sight of.
15	John F.	50	M.	Caretaker	Ulcer. Senile keratoma (hands).	10 years	R. ala nasi	X-rays. Ionization. Freezing.	Did well for certain time with X-rays, then relapsed and seemed unaffected. Same experience with ionization. Relapse treated with freezing. Remains well during last six months.
16	George S.	44	M.	Carpenter	Ulcer	25 years	L. lower eyelid (at inner canthus).	X-rays	Had about 150 exposures to X-rays during two years. Ulcer almost completely healed. Then a rapidly growing epitheloma developed (microscopical examination made). B.J.D. 18, p. 286.

No. of Case	Name.	Age.	Sex.	Occupation.	Type of Lesion.	Duration.	Distribution.	Treatment.	Subsequent History, and General Observations.
17	Lucy H.	59	F.	Married	Ulcer	5 years	R. temple, near orbit.	X-rays. Radium.	Treated with X-rays during 3 years. Could not tolerate any but very short exposures. Relapsed. Treated with radium in 1907, and seemed to do well for time. Relapsed with great extension of ulceration and erosion of bone. Alive 7 years after first visit, then lost sight of.
18	Alfred R.	43	M.	Clerk	Ulcer	4 years	R. side of nose	X-rays, 30 exposures.	Did well, healed for several years. Subsequent history unknown.
19	Edward W.	54	M.	Carman	Ulcer	—	Face	X-rays	Lost sight of.
20	Alice M.	54	F.	Cook	Ulcer	15 months	R. ala nasi	—	Sent for diagnosis by medical attendant. Treatment adopted by him not ascertained. No details available.
21	Louisa G.	72	F.	—	Ulcer	—	Face	—	Made only one attendance.
22	Flora C.	51	F.	Wife of civil servant.	Ulcer	3 years	Inner canthus L. eye.	X-rays	Ulceration completely healed. Report nine years later (1915) that she remains perfectly well.
23	Georgina C.	62	F.	Seamstress	Ulcer	10 years	Inner canthus L. eye.	X-rays. Excision.	Did not do well with X-rays. Excised after 3 months' trial, subsequent history unknown.
24	Charles L.	66	M.	Painter	Ulcer	Several years.	Cheek	X-rays. Ionization.	Improved and relapsed from time to time. Lost sight of after some 3 years.
25	James M.	48	M.	Steward	Ulcer	5 years	Nose	Ionization	Had one treatment with zinc ions. Healed perfectly. No recurrence. Remains well, 7 years later (1915).
26	Ellen B.	68	F.	Domestic	Ulcer	3 years	Temple	X-rays. Ionization.	Lost sight of after about 3 months' treatment.

27	Sarah W.	75 F.	Widow	Ulcer	—	Supraorbital	X-rays	Ulcer unchecked. Reported four years after to have destroyed eye (1913). Lost sight of 1913.
28	Jane B.	38 F.	Wife of clerk.	Ulcer	3 years	Bridge of nose.	Actual cautery; two applications.	Remains healed, but with considerable scar, and without recurrence six years later (1915).
29	James W.	69 M.	Gardener	Multiple ulcer	—	Neck	Excision	Treated area remains healthy. New ulcer reported by medical practitioner to have developed on other side of neck six years later (1915).
30	Sarah H.	50 F.	Wife of collector.	Ulcer	—	Cheek, near L. ear.	Ionization. Freezing.	Case referred to medical attendant, who cannot now trace her.
31	Arthur C.	42 M.	Carman	Ulcer	—	Cheek	Excision.	Developed on old patch of lupus. Subsequent history unknown.
32	Thos. J.	42 M.	Manufacturer.	Ulcer	2 years	R. inner canthus.	Ionization	Had five applications, and much improvement resulted, but was not cured, and would not remain in England. Reported to have had operation in Chicago for recurrence, and to have died 2½ years later.
33	Charles P.	40 M.	Coachman	Ulcer	1 year	Ala nasi	Caustics	Reported well. No recurrence.
34	Henry M.	57 M.	Asylum officer.	Ulcer	2 years	On hand	Excision	In site of old lupus. Clinical appearance of rodent Subsequent history unknown.
35	Francis A.	68 M.	Engineer	Nodule	2 years	Nose	Freezing	Completely healed after four treatments. Not seen since 1910.
36	Thomas H.	40 M.	Labourer	Ulcer	—	Behind R. ear	Excision	Operation 1910. Subsequent history unknown.
37	Elizabeth B.	44 F.	Married	Ulcer	6 years	Outer side, R. orbit.	Freezing	Completely healed after five treatments. Not seen since 1911.
38	Annie H.	40 F.	Wife of stationer.	Ulcer in site of mole.	12 years	L. cheek under eye.	Freezing	Completely healed after four treatments. Excellent scar. No recurrence 4½ years later. Seen 1915.

No. Case.	Name.	Age.	Sex.	Occupation.	Type of Lesion.	Duration.	Distribution.	Treatment.	Subsequent History, and General Observations.
39	Thomas M.	45	M.	Carpenter	Ulcer	4 years	L. cheek under eye.	Ionization	Two treatments, 5 years ago. No recurrence. Ulcer healed, leaving almost invisible scar. Seen 1915.
40	Henry P.	60	M.	Gasfitter	Ulcer; senile keratosis.	"Recent"	Nose.	Freezing	Ulcer developed on a senile keratoma. Treated 1910. Ulcer healed perfectly. Not seen since 1911.
41	Helen V.	30	F.	Domestic servant.	Nodule	2 months	Upper lip under nose.	Freezing	Six treatments. Seemed cured. Did not attend further.
42	Richard H.	60	M.	Railway official.	Ulcer	years	R. side of nose.	Freezing	Disappeared so completely after two treatments that patient, though warned of incomplete cure, did not attend. Recurrence 2 years later. Again ceased attendance after two treatments of freezing.
43	Hon. Chas. E.	63	M.	Gentleman	Ulcer	"Many years."	Inner canthus, left eye.	Freezing	After three treatments seemed cured. Recurred two years later and remained apparently cured, when he died from other causes.
44	Miss E. M.	64	F.	Spinster	Multiple ulcers	5 years	R. temple, tip of nose.	Freezing	Five treatments resulted in complete cure. No recurrence in 4½ years. (Report 1915.)
45	General K.	67	M.	Officer	Two nodules	4 years	Neck, wrist	Ionization. Freezing.	Complete removal. Dr. Clarke, of Horley, reports "absolute cure" (1915).
46	William J.	58	M.	Clerk	Ulcer	—	Cheek	—	Medical attendant sent case for opinion only. Lost sight of.
47	Eliza R.	64	F.	Married	Ulcer	—	Face	—	Lost sight of.
48	Hannah B.	68	F.	Married	Ulcer and nodule	12 years	L. side of nose and both eyelids.	Freezing	Remains healed and without recurrence four years later. (Report by medical attendant, February, 1915.)

49	Mrs. C.	60	F.	Married	Ulcer and warty excrescence.	12 years	Nose	Freezing, two applications.	Healed perfectly. No recurrence up to time of death, four years later from "intestinal obstruction."
50	Sophia B.	74	F.	Married	Ulcer	4 months	R. arm on site of scar, glands not enlarged.	Excision	Sent for opinion only. Referred to medical man in charge who reports (1915) no recurrence.
51	George R.	44	M.	Musician	Ulcer	12 months	Infraorbital, L. side.	Freezing	Lost sight of.
52	Frances S.	42	F.	Seamstress	Nodule and ulcer.	Ulceration 3 months.	L. ala nasi concha L. ear.	Freezing	Four treatments, July 1911. Remains well. No recurrence February 1915.
53	William T.	29	M.	Railway porter.	Rodent ulceration.	—	R. side nose	Freezing	Two treatments, July 1911. Writes, February 1915, "No recurrence."
54	Mrs. R.	64	F.	Widow	Ulcer	2 years	L. side nose	Freezing	Two treatments, April 1911. Writes, February 1915. No recurrence.
55	Wm. A.	58	M.	Banker	Ulcer	2½ years	L. side nose	Freezing	Two treatments, October 1911. Ulcer healed. Dubious thickening noted in site two years after. Again frozen once. Recent recurrent ulcer in site treated two years after (1915).
56	Joseph F.	75	M.	Pensioner	Ulcer	3 years	Chin	Excision	Had had epithelioma of hand 10 years before and hand was amputated. Growth on face seemed increasing rapidly and excision practised. Glands not enlarged.
57	Chas. C.	48	M.	Labourer	Ulcer	4 years	R. ala nasi	Freezing	Apparently cured after five treatments; small new rodent nodule appeared in vicinity of old scar two years after (1912) and a new nodule in 1914 at edge of old scar.
58	Eliza M.	70	F.	Married	Ulcer	—	Nose	Freezing	Reported by her medical man, Dr. Clarke, of Horley, to remain perfectly well since October 1911 to present date.

No. of Case.	Name.	Age.	Sex.	Occupation.	Type of Lesion.	Duration.	Distribution.	Treatment.	Subsequent History, and General Observations.
59	Joseph S.	63	M.	Coachman	Ulcer	—	L. side orbit	Freezing	Treated in country by medical man in charge. First seen 1913. Writes (1915) "My eye does not trouble me much, and when it do want doing I go to the Doctor."
60	Eliza K.	43	F.	Nurse	Ulcer	—	Face	Refuses treatment.	—
61	Edith B.	43	F.	Married	Ulcer	10 years	L. canthus eye	Freezing	Four treatments, April 1912. No recurrence.
62	Mrs. T.	50	F.	Married	Ulcer	2 years	L. side nose	Freezing	Healed after two treatments (June 1910). Remains healed and no recurrence (1915).
63	James W.	59	M.	Labourer	Ulcer	10 years	L. ala nasi	Excision. Freezing.	Was excised, and recurred. Recurrence treated with freezing.
64	Arthur S.	62	M.	Clerk	Ulcer	—	L. infraorbital region.	Freezing	Freezing. April 1912. No recurrence reported to date.
65	Mrs. W.	55	F.	Laundress	Ulcer	18 months	Nose	Freezing	Three treatments, July 1912. Remains healed and no recurrence noted. February 1915.
66	Mrs. B.	30	F.	Wife of doctor.	Nodule	12 months	R. cheek	Freezing	One application. Returned to India unexpectedly. Subsequent history unknown.
67	Richard S.	54	M.	Butler	Multiple ulcers	2 years	Bridge of nose (R. side), R. ala nasi; L. ala nasi; inner canthus R. eye.	Freezing	Treated three years ago with freezing for two small rodent ulcers, on inner canthus of R. eye and bridge of nose. These remain healed. He developed new rodent nodule on R. ala nasi about 1 year after, which remains healed after freezing; and he has recently developed a new warty rodent on the L. ala nasi, now under treatment.
68	Miss R.	45	F.	Sister of doctor	Nodule	18 months	Tip of nose	Freezing	Two treatments July 1912. Remains well (1915).

69	William S.	49 M.	Publican	Ulcer in site of burn.	8 years	R. infraorbital	Freezing	Three treatments, November 1912 to January 1913. Ulcer remains healed, new nodule half inch removed from old site shows itself two years after. Now under treatment.
70	George P.	56 M.	Dairyman	Ulcer	2 years	Pinna of R. ear.	Excision. Freezing.	Began as "wart" which was excised, but growth recurred three months later. Received three treatments with freezing February 1913; seen February 1915. No recurrence, no ulcers.
71	Caroline M.	48 F.	Married	Ulcer	3 years	Face	—	Did not attend after first visit.
72	Annie F.	60 F.	Married	Ulcer	3 years	L. lower eyelid.	Freezing	Three applications resulted in complete healing of ulcer (December 1910). Returned with small fresh ulcer January 1913; again frozen.
73	Thos. B.	62 M.	Labourer	Ulcer	—	Face	Freezing	Three treatments with successful result. March 1913.
74	Kate S.	44 F.	Housekeeper	Ulcer	6 years	L. cheek	Freezing	Six treatments, last in June 1913. No recurrence; healing complete (1915).
75	Edward S.	61 M.	Bath chair attendant.	Ulcer	15 years	L. side of nose and cheek.	Freezing	Was given three treatments in April 1912. Ulcer healed completely, and has remained healed, but a new ulcer appeared nine months later on the cheek, an inch away from old lesion which remains healed.
76	Frederick T.	53 M.	Decorator	Ulcer	16 months	R. ala nasi	Freezing	Treated three times. No recurrence since 1913.
77	Major M.	65 M.	Retired army officer.	Multiple ulcers	Many years.	Lower L. eyelid and bridge nose.	Freezing	Ulcer on nose completely healed after two applications (1913) and has not recurred since. The ulcer on eyelid proved more obstinate, and he ceased attendance before it was healed. His medical man, Dr. St. John, of Derby, reports (February 1915): "Nose well, eyelid still partially ulcerated."
78	James L.	69 M.	Pensioner	Multiple ulcers. Senile keratomata on hands and ears.	4 years	R. cheek near ear. L. side of forehead.	Freezing	Earliest lesion came in site of bite of fly. Numerous small ulcers grouped in patch. Treated at intervals during six months, quite healed. New ulcer came a year later on forehead; under treatment.

No. of Case.	Name.	Age.	Sex.	Occupation.	Type of Lesion.	Duration.	Distribution.	Treatment.	Subsequent History, and General Observations.
79	Maria T.	49	F.	Married	Ulcer	—	Ear	Freezing	Attended irregularly. Reports herself (1915) "better," but not seen.
80	Mrs. D.	26	F.	Married	Ulcer	3 years	Temple	Refused all treatment.	—
81	William G.	70	M.	Pensioner (ex-gardener).	Ulcer. Senile keratosis.	4 years	Forehead. R. supra-orbital.	Freezing	Had one treatment, November 1913. Recurred six months after. Has numerous keratomata on dorsum of hands and on pinna of both ears.
82	Jane C.	62	F.	Married	Ulcers	7 years	R. infraorbital	Freezing	Several small lesions in close juxtaposition in patch under R. eye. Last treatment November 1914. Ulceration healed.
83	Eliza S.	48	F.	Married	Ulcer	12 months	Above R. eyebrow.	Freezing	Four treatments in March 1914. Ulcer healed. No recurrence to date.
84	Joseph C.	54	M.	Labourer	Ulcer	7 months	Neck, behind angle of R. jaw.	Freezing	Father died of "cancer of rectum." Patient treated in 1913-14 with six applications of freezing. Remains well a year after.
85	Miss D.	62	F.	Independent spinster.	Ulcer	10 years	Nose	Freezing	Wartlike growth appeared in site of pressure of pince-nez glasses. Ulcerated. Treated June 1913. Remains quite healed. No recurrence February 1915.
86	Mrs. G.	67	F.	Married	Nodule in warty pigmented keratoma.	6 months	L. side of bridge of nose.	Salicylic acid plaster.	First seen 1909. Died 1913 of cerebral hemorrhage. Her doctor writes: "Growth had quite disappeared and no recurrence had occurred to time of death."
87	Miss C.	43	F.	Independent spinster.	Nodule	12 months	Back of neck	Freezing	Disappeared with two applications. No recurrence up to date, i.e. 12 months after last treatment.

	Mrs. B.	42	F.	Married	Nodule	2 years	Tip of nose	Freezing	Treatment undertaken by medical practitioner in charge of case.
89	Fred V.	60	M.	Stockbroker	Ulcer	6 months	Bridge of nose	Freezing	Treated April 1912. Remained well to date (1915).
90	Mrs. W.	72	F.	Widow	Ulcer, began as nodule.	18 months	Dorsum of foot.	Excision	Ulcer was chronic and no enlarged glands felt in groin. Growth proved on microscopical examination to be a navo-carcinoma. Glands not involved, as demonstrated microscopically. Dr. Clarke, of Horley, who sent the case, reports: "Patient still alive (1915), but fear secondary visceral invasion."
91	David N.	83	M.	Hotel keeper.	Ulcer and senile keratomata.	2 years	Cheek	Freezing	Ulcer healed after five applications. Remains healed 20 months later.
92	Abel V.	71	M.	Retired	Nodule and ulcer.	5 years	Nape of neck	Excision	Father died of "cancerous ulcer on neck," æt. 95. Very numerous senile keratomata on cheek; back of hands. Reported <i>Brit. Journ. Derm.</i> , March 1915.
93	Eliza B.	50	F.	Cook	Numerous senile keratomata on face and hands.	6 years	R. temple	Freezing	Healed after six applications. Remains healed to date nine months after last treatment.
94	John L.	80	M.	Solicitor	Ulcer	20 years	Whole of bridge of nose and sides.	Freezing	Rodent ulcer removed by excision 15 years ago. Recurred <i>in situ</i> , caused extensive ulceration but superficial. Healed perfectly under freezing; treated 1913, few new nodules treated at margin from time to time.
95	Edwin B.	65	M.	Schoolmaster	Ulcers. One on R. cheek, one on L. ear.	4 months; 8 months.	R. cheek; L. ear; R. temple.	Excision. Freezing.	Has numerous keratomata on neck and hands, nose and ear. Ulcer on R. cheek excised eight years ago. No recurrence. New deep ulceration in sulcus between L. pinna and mastoid. Wife died of "cancer of liver" 10 years ago.
96	Fred J.	41	M.	Business-man.	Ulcer	9 years	Whole of chin from lip to under jaw eroded.	Actual cautery. Excision. X-Rays. Excision. Ionization. Freezing. Radium. Arsenical paste.	Ulcer began in 1906. Spread unchecked by numerous methods of treatment. Recurred twice after complete excision. Worst effect produced by radium, "spread rapidly in five weeks." Latest and most satisfactory effect with arsenical paste.

No. of Case.	Name.	Age.	Sex.	Occupation.	Type of Lesion.	Duration.	Distribution.	Treatment.	Subsequent History, and General Observations.
97	Sarah O.	63	F.	Bargee	Ulcer	2 years	R. thigh	Excision	Microscopically "Rodent." No glands enlarged. Ulcer 2 ins. by $1\frac{1}{2}$ ins. Very vascular, no ridge, no induration. History of pigmented mole in site of lesion.
98	Joseph K.	66	M.	Labourer	Ulcer	—	Face	Freezing	Writes (1915) "Much better," but not seen since last treatment, 6 months ago.
99	Edward C.	53	M.	Financier	Ulcer	9 months	L. eye, inner canthus.	Radium, July 1913. Freezing, December 1913.	Was given two 16-hour treatments with radium on two consecutive days. Ulcer unchecked, and developed severe conjunctivitis in eye. Then frozen twice; ulcer completely disappeared. Remains well 15 months after, but still suffers from pain in L. eye, ascribed to radium.
100	Emily L.	69	F.	Married	Ulcer	—	Nose	Freezing.	One treatment. To continue.
101	William F.	68	M.	Labourer	Multiple, two nodules and one ulcer.	Nodules, 7 years. Ulcer, 3 years.	Forehead, cheek, nose.	Freezing. Excision.	First of three cases (in following order) of clinical group "epithelioma adenoides cysticum." One tumour, on forehead excised for histology, which was "typical of Brooke's disease." Ulcer and other nodule healed with freezing.
102	Alphonso W.	40	M.	Painter	About 60 nodules, none ulcerated.	20 years	All over face, neck, chest.	Has enlisted and cannot be treated.	Strong family history of similar tumours. Histology of rodent. Several tumours deeply pigmented, pigmentation appearing after growth, not before.
103	William H.	58	M.	Carpenter	Over 100 nodules, two deep ulcers.	15 years	All over the face, neck, ears, chest, arms, axillae.	Scraping. X-rays. Freezing. Radium.	Ulceration had occurred in two of the lesions only, dating from 1903. Been 8 years under X-ray treatment. The largest ulcer, on neck, healed completely under freezing. The other ulcer, on chin, contracted greatly in size, but patient resented the treatment, and was put on radium, which he is now having.

104	Emily L.	51	F.	Married	Ulcer	5 months	Nose, left side of bridge.	Freezing. One treatment.	Still under treatment.
105	Sir George S.	63	M.	Gentleman	Nodule	5 years	Upper lip, under nose.	Freezing	Disappeared under 3 treatments (April 1913). No recurrence to date (1915).
106	John M.	52	M.	Merchant	Warty nodule	3 months	Upper lip, under nose.	Excision	Subsequent history good to date (12 months since operation).
107	Mrs. G.	65	F.	Widow	Indurated patch on senile pigment.	8 months	R. cheek	Freezing	Disappeared. Treated 6 months ago. No recurrence to date. Has several pigmented patches of old duration, on face and hands; on one of these on face growth appeared as circumscribed patch of induration about the size of sixpence.
108	Chas. L.	57	M.	Banker	Indurated patch	4 years	L. cheek	Freezing	Disappeared with two treatments (4 months ago). Still under observation.
109	Mrs. W.	66	F.	Married	Indurated patch	2 years	L. cheek	Freezing	Disappeared with one treatment (still under care).
110	A. B.	50	M.	Labourer	Ulcer on site of tertiary syphilide. Ulcer	18 months	L. mastoid	Excision	Subsequent history unknown.
111	George L.	59	M.	Greengrocer		12 months	Nape of neck	Excision	Operation recent. No glandular invasion found. Microscopically "Rodent." Senile pigmented patches on hands.
112	Mrs. P.	46	F.	American lady.	Ulcer	Several months.	L. lower eyelid.	X-rays, then radium.	Ulcer healed at first with X-rays and recurred <i>in situ</i> . Later history unknown.
113	William B.	52	M.	Butler	Ulcer	18 months	L. side of nose near orbit.	Freezing	Still under treatment.
114	Mrs. D.	59	F.	Married	Ulcer	2 years	L. side of nose	Freezing	Ulcer came in site of scratch, and refused to heal Still under treatment.
115	Mrs. L.	60	F.	Married	Pigmented warty growth on congenital mole.	2 years	Above R. orbit on forehead.	Freezing	Still under treatment. Pigmented mole on forehead began to swell and be uncomfortable two years ago. Has unchanged pigmented mole on chest.

No. of Case.	Name.	Age.	Sex.	Occupation.	Type of Lesion.	Duration.	Distribution.	Treatment.	Subsequent History, and General Observations.
116	Walter H.	43	M.	Barge builder.	Ulcer and nodule.	6 weeks	Ulcer at outer angle of L. eye; nodule on L. malar bone.	Smaller nodule to be excised for histological investigation.	History of having had a portion of the bottom of barge impinging on his cheek so as to cause wound, which became septic; typical rodent ulcer, and nodule developed in positions named. No glandular invasion.
117	John M.	73	M.	Sheep farmer.	Wart and ulcer; senile keratosis.	2 years	Back of neck; dorsum of hand.	Freezing	Lived in New Zealand all his life. Flat pigmented warty growth, size of a shilling, on back of neck. Warty pigmented keratoma on dorsum of left hand, which has ulcerated in last two years. Still under treatment.
118	Mrs. W.	60	F.	Married	Nodule	2 months	R. cheek	Freezing	Father and brother died of cancer, æt. 70 and 65.

CASES IN WHICH LOWER LIP WAS INVOLVED.									
119	George S.	44	M.	Horse-stud trainer.	Plaque on lip	4 years	Lower lip	Freezing and excision.	Character doubtful, and excision advised.
120	Ernest M.	60	M.	Gentleman	Plaque	3 years	Lower lip	Freezing	Induration disappeared.
121	Dr. E. B. F.	46	M.	Physician	Plaque	Years	Lower lip	Freezing	Induration disappeared.
122	Thomas B.	42	M.	Labourer	Plaque	1 year	Lower lip	Freezing	Induration disappeared.
123	John T.	52	M.	Postman	Warty patch	—	Lower lip	Freezing	Treated in 1912 (June). No recurrence.

124	James W.	59	M.	Dairyman	Ulcer	Many years.	Lower lip and chin.	Simple dressings.	Too advanced for treatment. Whole area between lip and under-surface of jaw involved. Died recently six months after admission.
125	Henry S.	58	M.	Porter	Ulcer	—	Lower lip	Excision	—
126	Mrs. M.	30	F.	Married	Ulcer	18 months	Lower lip	Radium	Disappeared. No recurrence in two years.
127	William P.	72	M.	Labourer	Ulcer	4 months	Lower lip	Freezing	No glands were enlarged. Patient refused operation and was improved very considerably by freezing, but ceased attendance before ulcer had healed and was lost sight of.

ORTHOPÆDIC SURGERY.

By A. H. TUBBY, M.S., F.R.C.S.

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ORTHOPÆDICS FOR THE GENERAL PRACTITIONER.

JAMES WARREN SEVER (*Inter-State Medical Journal*, February, 1914, p. 125) discusses some common orthopædic affections which come more particularly *under the notice of the general practitioner*, and he selects—

- a. *Limping in Children*,
- b. *Lateral Curvature of the Spine*,
- c. *Congenital Club-foot*,
- d. *Synovitis of the Knee-joint*, and
- e. *Infantile Paralysis*,

as examples to illustrate his thesis.

a. *Limping in Children*.—He remarks that it is almost a daily experience to see a child brought to the hospital on account of a limp in one leg of greater or less duration, and frequently the parents state the trouble is all in the knee. When the child is stripped and the character of the gait is noted, it will be seen at once whether the cause of the trouble is in the knee, hip, or ankle; further examination with the child on its back on the table will localize the trouble, which is generally in the hip. Pain in the knee without anything to show for it at that joint usually means hip trouble, both these joints, therefore, must always be examined carefully.

Another not uncommon cause of a limp is due to muscle strain of the leg following a fall or injury. In such cases, there is usually a slight limp of short duration, and a history of sudden onset after injury. On examination, it is found that there is very slight limitation of movement of the hip, especially in the directions of outward rotation and hyper-extension, and an X-ray of the hip joint usually shows nothing abnormal.

Some of these cases, however, are due to slight synovitis of the hip joint, analogous to "water on the knee," and readily clear up with rest in bed and a flannel spica. Other cases are, however, of a more severe description, and an X-ray shows a partially displaced epiphysis. If the displacement is not at all great, the best method of treatment is to apply a plaster spica with the leg slightly abducted; when the pain has ceased, the patient is allowed to get about on crutches. Still more severe examples of slipped epiphysis call for forcible abduction of the leg, under ether, followed by the use of plaster of Paris and later on of a metal splint, which will keep the leg abducted. As Royal Whitman has shown time after time, this is the correct treatment for such cases.

When a limping child is seen, we should also bear in mind congenital dislocation of the hip, coxa vara and rickets, fracture of the neck of the femur and coxa valga. It should, therefore, be the rule not only to examine the hip and knee, but the spine as well. Tuberculosis of the spine, accompanied by a psoas abscess, causes a certain amount of flexion of the leg and irritation about the hip muscles; so that, when a patient attempts to walk, he will show some hesitation, of which the cause can be found on examination. A right-sided limp should lead to examination of the iliac fossa for an inflamed or suppurating appendix.

b. *Lateral Curvature of the Spine*.—To those who are doing school-inspection work, the following points should be emphasized. A child who carries one shoulder higher than the other probably has some kind of lateral curve, and so, too, has every girl who has a so-called high hip or large hip. It is necessary then to have the child stripped to the hips and examine the spine carefully.

Lateral curvature is of two kinds—

- (1) postural or physiological, and
- (2) structural or organic.

The first is curable by proper exercises, massage, and careful attention to the avoidance of mal-position. In the latter case, the treatment for the physiological type must be supplemented by some form of support, and it is well to

recognize that in many cases it is useless or even harmful to carry out any treatment without instrumental support. It will readily be seen that when the spine is made more flexible by exercises it will consequently sag into a worse position than before, unless the improvement brought about by exercises, is maintained in the intervals by a support.

c. *Congenital Club-foot*.—A club-foot, improperly treated, is one of the most difficult problems we have to meet, but it can be cured absolutely, if the child is given adequate treatment early enough, and by this is meant within the first eight weeks of life. Time lost at the start can never be regained, and the earlier the treatment is begun, the more normal the foot the patient will have later in life. Manipulations may be commenced from the first day, and a suitable form of retention splint applied. The great object to aim at is over-correction of the deformity, and over-correction as applied to a congenital club-foot means a foot well everted, abducted, and capable of full dorsiflexion. Later on, massage especially of the anterior and external muscles, the application of a light support for from six months to a year to maintain the over-correction, and the constant use of the foot in weight-bearing, when the child is old enough to walk, are the measures indicated.

d. *Synovitis of the Knee-joint*.—This common condition, known as "water on the knee," is generally the result of trauma, and may be antecedent to tuberculosis. The treatment, therefore, should be complete and thorough from the first; and the indications are to fix the joint, to prevent weight-bearing, to diminish the pain and tension in the joint, to get rid of the excess of synovial fluid, and to restore function within a reasonable time, without too great loss of power and muscular atrophy of the leg. To carry out these objects, a posterior splint, slightly bent at the knee, and rest in bed so as to keep the leg in a horizontal position are required. An ice-pack over the knee for 48 hours will limit the effusion, and it is rarely necessary, or indeed advisable, to tap the joint.

After the first few days, the patient can get about on crutches, the weight being taken off the joint, and then radiant heat and gentle massage are of service. After the first week, the splint is taken off, and the knee bandaged with a flannel

bandage, after having placed a horse-shoe pad above the patella, so as to compress the synovial membrane fully, and then limited weight-bearing is allowed. The results are far better than if the splint is kept on for three weeks or more, in which time the joint, although it may have no fluid in it, will be found to be motionless and stiff, and several weeks may be spent in recovery of movement and in regaining muscular strength.

e. *Infantile Paralysis*.—This, especially in its epidemic form, is one of the diseases most to be dreaded. Recent experiences show that in the epidemic form the symptoms are often anomalous and misleading. The diagnosis before the onset of paralysis is extremely difficult, especially at the beginning of the epidemic. In an acute case of this kind, the first thing is absolute rest and free purgation. In many instances, the pain is relieved by putting the child on a Bradford frame, or using a plaster of Paris bandage. After the acute period, it is of the utmost importance to prevent stretching of the muscles, and the limb should be placed in such a position that there is no pull whatever upon them. A little ingenuity in the application of the splints may be required to effect this. The weakened limbs should be kept continuously warm, and suitable woollen clothing worn. It is doubtful if electricity does good in any stage in children; it irritates and frightens them, and has largely been given up. Massage, gentle in application, is of the greatest service, but the writer of this review is of opinion that much harm results from forcible and prolonged massage.

THE USE OF SILK LIGAMENTS AT THE ANKLE IN INFANTILE PARALYSIS.

Robert W. Lovett (*American Journal of Orthopædic Surgery*, January, 1915, p. 415) says that the use of silk ligaments to replace arthrodesis in complete infantile paralysis of the foot has been both advocated and condemned. It is a comparatively new operation, and, if successful, yields better results than arthrodesis, because the latter leaves behind it a stiff ankle joint; whilst, after successful operation by silk ligaments, plantar-flexion only is checked and dorsiflexion is allowed, making walking much easier. The rationale consists of the attachment of an artificial silk ligament around which fibrous tissue forms, making a new ligament. The silk is not

put in as a ligament in itself, but it serves as a base for the deposit of fibrous tissue, and therefore a long after-treatment is obviously necessary.

The results of 79 operations at the Children's Hospital, Boston, the work of six operators, are given. The technique, however, varies amongst the operators. At first, twisted silk was used, but this was followed occasionally by infection and extrusion of the silk. In 1910, however, braided silk Nos. 12 and 14, prepared in paraffin, was used. In 1913, Turner's silk No. 11, boiled in oxy-cyanide of mercury for 30 minutes, and then boiled with the instruments for 10 minutes, was tried. Later on, twisted silk Nos. 16 and 18, boiled for 20 minutes in a 1 in 1,000 solution of bichloride of mercury, and then boiled again in water with the instruments, was employed.

Lovett says that the use of any one method of silk preparation is not responsible for the expulsion of the silk. He has shown that this latter event may occur with various methods. The writer of this review, however, has formed the opinion, from some experience of this matter, that the best way of preparing the silk, and of anticipating the possibility of its being extruded, is to use twisted silk of No. 3 or 4 of our gauge, which has first been soaked in ether, then boiled, and afterwards placed for a week in a 1 in 1,000 solution of biniodide of mercury. We have not had, so far, any case of infection or silk sinus formation. In two of Lovett's cases of implantation there was direct operative infection, and the silk had to be removed in one case in about three weeks and once in four weeks. The other cases, before they gave trouble in this direction, ran from three to five months, and in one example to 15 months. In this last case it seems fair to attribute the trouble to boot trouble, but in the others it occurred before the boot was put on.

Three different methods of implanting the silk have been used—

A. Periosteal Insertion.—An incision is made over the skin of the tibia, the periosteum turned back, and the silk quilted up one side of the reflected periosteum and down the other, and two, four, or more strands are then carried down under the annular ligament by means of a long flat probe, with a

large eye, to an incision made in the tarsus, where it is desired to attach the silk. Here it is again quilted into the periosteum. The incision may be at the inner or outer side of the foot or at the middle, the strands being opposite to the desired spot and fastened there.

B. The Open Bone Method.—The tibia is cut down upon and the periosteum deflected, then a bone drill, with an eye, is driven through the tibia from side to side. A similar hole is made in the tarsus, and the silk is then secured through the holes.

C. The Subcutaneous Bone Method.—In this method a drill, with an eye, is passed directly through the skin, without an incision, at the desired spot on the foot, and by means of a leader of silkworm gut the silk is carried through the drill-hole. The tibia is then drilled in the same way, without an incision, and through the drill-hole, slightly enlarged if necessary, a probe, with an eye, is passed down and out through one of the drill-holes in the tarsus, the silk passed through it, and drawn back and out of the upper hole. The same procedure is repeated for the other drill-hole of the tarsus. The silk strands are then drawn through the hole in the tibia by a leader, and the drill-hole where the strands emerged is enlarged sufficiently to allow a deep knot to be tied.

As to the *choice of methods*, Lovett prefers the open bone drill method, because the proportion of good results is greater by this than by the other two, and silk, implanted in the periosteum, often tears away. As to results, he classifies them as successful, when the desired result is obtained and the foot held at a right angle; partially successful, when the position was improved by operation, but there was some dropping of the foot; and as failures, when there is no perceptible improvement, although it is interesting to note that in no case was the condition made worse by it. Of 44 periosteal operations, where the result has been verified, 13 were successful, 9 partially so, and 22 failures. Of 17 bone drill operations, where the result was verified, 12 were successful, 2 partially so, and 3 were failures. Lovett's tables show a progressive improvement in results as the years pass by.

All the above have been done for paralytic talipes equinus; and Lovett, in addition, gives three cases of talipes calcaneus

which have been operated upon by putting in a posterior silk ligament from the os calcis to the tibia. One of them was a complete failure; in the second, the calcaneus was improved, and in the third, although there was an abnormal amount of dorsiflexion, the foot was useful and much improved. In our own practice, we have had four very successful examples of moderate talipes calcaneus treated by this method, combined with shortening of the tendo Achillis.

It is often stated that whilst the leg grows, the silk does not, and that deformity follows as a result, but in no case of his series has Lovett seen any suggestion of this, nor has there been any evidence of over-correction in any way. The cases are kept recumbent for two or three weeks after the operation, and are kept quiet for two months or so; then, they are put in plaster for from four to six months, and walking is restricted until a year after the operation. During this time, no unsupported weight should be put on the silk ligaments. In careless patients, it is desirable to fix the foot in plaster of Paris for a year. Lovett regards the implantation of silk ligaments as a useful operation, resulting in a good proportion of successes in paralytic feet. The most rigid technique is necessary, and prolonged fixation and support are essential, because the silk is not strong enough to hold up the foot of itself, but serves as a core of a ligament, which is the real supporting structure.

ALBEE'S BONE-GRAFTING OPERATION IN POTT'S DISEASE OF THE SPINE.

Edwin W. Ryerson (*American Journal of Orthopædic Surgery*, October, 1914, p. 259) reports the results of a series of 26 cases operated upon by him, and considers that they will bear comparison with those under any other form of treatment yet devised, especially when it is remembered that the majority of these patients have been long and patiently treated by conservative orthopædic measures, and were operated upon as a last resort.

The method has earned for itself a distinct place in the treatment of spinal tuberculosis, and can almost be classed as the acme of conservative treatment. As to technique, the operation should be done rapidly but not hastily, and a double-bladed electric saw is a necessity for the saving

of time. The splitting of the spinous processes must be carefully done, and a narrow rather than a broad chisel should be used. No attempt should be made to split the shafts of the spinous processes in children, for they are too thin. The most that we can do is to split the tips, and strip off the periosteum along one side. The muscles of the periosteum should not be separated on the opposite side of the spinous processes. Heavy braided silk sutures should be used. They should be boiled in perchloride of mercury and then in paraffin. These sutures should be strongly placed in the tissues or in the tips of the spinous processes themselves.

If it is desired to make any correction of the deformity, a point of great importance is to use a bone splint that will extend well above and below the diseased vertebræ. It is not too much for it to lie two or even three vertebræ above and below the limits of the disease, and it is far better to extend a vertebra too many than one vertebra too few. Incidentally, we may remark that it has been shown by Albee that this method of ankylosing the spinous processes of the vertebræ does not interfere with growth, for the growth increases *pari passu* with that of the spine.



TWO CASES OF PHLEGMONOUS DUODENITIS.

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TWO cases of acute diffuse inflammation of the duodenum or phlegmonous duodenitis have come under my notice, and are perhaps sufficiently rare and interesting to be worth recording. In searching the literature of diseases of the duodenum, I have found notes of only two cases of this rare disease.

The notes of the two new cases are as follows :—

CASE I.—The patient, Ellen H., was a married woman, 33 years of age; she had had four children, three of whom died young. She had never had jaundice nor suffered from colic or vomiting. Except for occasional slight attacks of biliousness, she had led a healthy life.

About an hour and a half after eating some mutton for dinner, she was seized with a shivering fit and acute abdominal pain; in consequence, she had to lie down and on taking a drink she vomited. The abdominal pain continued, and she became feverish, and vomiting became constant after every drink. Her bowels were opened several times during the afternoon and night. The next morning, the pain was worse, and the vomit became biliary in character. I saw her that evening; the pulse rate was then 140, and the temperature 104.2 F. There was no jaundice, and the eyes were not sunken; the tongue was clean but dry. The abdomen was slightly distended, more particularly in the upper part; there was visible peristalsis. The pain was referred to the umbilical and right iliac regions. There was no rigidity, but considerable tenderness, most marked in the upper part of the abdomen. The stomach was dilated, and a well-marked splash was obtained. The spleen and liver were enlarged and easily felt; the lower edge of the liver extended two inches below the costal margin. Examination of the heart, lungs, urine, rectum, and vagina proved them to be normal.

An operation was performed the same night; the abdomen was opened in the middle line, and some recent plastic peritonitis was found around the duodenum and at the back of the stomach; there was no perforation of either the stomach or duodenum. As the patient was almost moribund, this area of local peritonitis was drained. Shortly after the operation, the patient died.

A post-mortem examination was undertaken the next morning with the following result :—The *stomach* was slightly dilated and showed some follicular gastritis. The *duodenum* for the first 2½ inches from the pylorus was normal except for a slight follicular inflammation. Beyond this, starting quite abruptly, for about 8 inches, the duodenum was intensely

inflamed, and this inflammation involved the whole thickness of the duodenal walls, which were thickened to about three times the normal. On section, the walls of the duodenum were found to be studded with numerous small abscesses. The mucous membrane was intensely injected and inflamed, but showed neither ulceration nor any signs of old disease. The orifice of the common bile duct was included in this inflammation, but the duct itself was not inflamed, and there were no stones present in the biliary or pancreatic ducts. The *liver* and *spleen* were enlarged and abnormally soft. The *pancreas* was normal. The *intestines* beyond the duodenum were collapsed but otherwise normal. The other organs of the body were healthy. Cultures were grown from the liver, spleen, and wall of the duodenum, and they proved the presence of streptococci.

CASE 2.—The patient, Moses W., aged 55, a farmer, had been troubled for the past five or six years with recurring attacks of abdominal pain and vomiting, which lasted 24 to 48 hours. The last attack occurred six months ago. On February 20th, he was at work as usual until the evening, when he complained of pain in his abdomen and was sick; shortly after vomiting he had a rigor. Next day the pain increased, and the vomiting became more frequent and biliary in character; towards evening, Dr. Mann, of Revesby, to whom I am indebted for some of these notes, saw the patient; his pulse rate was 100, and his temperature 101° F.; the abdomen was not distended, and there was no rigidity or visible peristalsis; the whole of the abdomen was markedly tender. As the bowels had not acted, and no flatus had been passed since the onset of the illness, a large enema was given, and a little flatus was passed. The next day (February 22nd) there was a second rigor, and the man was worse; his pulse rate was 120, and his temperature 102°. I saw him in the afternoon, and found his pulse rate 120, and of small volume; he was constantly sick, his tongue was clean and moist. The abdomen was slightly distended and very tender in its upper part, there was no rigidity. The man was not jaundiced. I suggested as a diagnosis that he was suffering from some out of the way condition, such as acute pancreatitis or thrombosis of mesenteric vessels, and recommended an operation.

At 6 p.m. I operated, and found on opening the abdomen some clear fluid in the pelvis; there was no perforation of the stomach or duodenum; the whole of the duodenum and about the first eight inches of the jejunum were swollen to about three and a half times their normal size, and were intensely inflamed. There was a little lymph covering the right side of the duodenum and the adjacent peritoneum at the duodeno-jejunal flexure. The inflamed bowel was dark red, and in places black in colour; it felt solid, and was heavy. At the pylorus, the line of inflammation was sharply defined, but in the jejunum it ended gradually. There was no thrombosis of the mesenteric vessels, and there were no stones; the pancreas, liver, spleen, and other organs appeared normal, and there was no general peritonitis.

As the duodenum appeared solid and obstructed, I rapidly did a posterior gastro-jejunostomy, joining the stomach to healthy jejunum; I then inserted a drain and partly closed the abdominal wound.

The patient rallied for a time, the pulse rate fell to 100, but later he became worse and died on February 24th, 32 hours after the operation.

Unfortunately, permission was not granted for a post-mortem examination.

For purposes of comparison with the above, I give below an abstract of the only two cases I have been able to trace in the literature of the duodenum.

CASE A.—This case is reported by Eskridge.¹ The disease occurred in a woman, aged 55, who had had four children. She had been troubled with indigestion and vomiting for 14 years. On September 16th, 1878, she was seized with acute abdominal pain whilst walking, and this was followed by a rigor and vomiting; later, she became collapsed, and the pulse rate rose to 120. The next day, her bowels were opened, and she gradually improved, and eventually recovered. On November 16th, she had another similar attack with a rigor and vomiting; the next day her bowels acted, but she did not improve, and on November 26th she died.

The post-mortem examination revealed congestion of the mucous membrane of the stomach. The duodenum was inflamed, its walls were very dark, and it was surrounded by localized peritonitis. The mucous membrane was almost black, up to 12 inches from the pylorus. The small intestine was normal. There was a large stone in the gall bladder, but no connection between this stone and the disease was mentioned. The liver, pancreas, and spleen were normal.

CASE B.—This case is recorded by Weichselbaum,² who gives only the post-mortem report of the duodenum which was the seat of a phlegmonous inflammation. The outer cells of the mucous membrane seemed in places shed; there were no ulcerations; the thickness of the duodenum was great, and in its walls were scattered small purulent collections. The peritoneum had purulent flakes on its surface.

In each of these four cases, the whole thickness of the duodenum was involved in an intense inflammation, which caused a fatal termination.

It is known that persons suffering from severe burns and septicæmias do, in rare cases, develop ulceration of the duodenum. After the artificial production of septicæmia in animals, congestion of the duodenum is generally found. Subcutaneous injections of toluylenediamine in dogs has been found to cause destruction of the blood, jaundice, and an intense inflammation of the duodenum, and this duodenitis extended from the pylorus for about 8 inches, and was most marked at the biliary papillæ. In one case, it was shown that the disease had commenced at the biliary papillæ. The amount of congestion and inflammation of the duodenum varied according to the dose of poison injected.

These facts and experiments suggest that a substance has

entered the blood and been excreted by the bile, and on entering the duodenum has combined with or been split up by certain of the duodenal contents, and an intense irritant poison has been formed which has attacked the walls of the duodenum, setting up a violent inflammation.

In no one of the four cases was there any evidence of old ulceration of the duodenum or other pathological lesions; the disease in all of them appeared to have developed idiopathically. In cases 1, 2, and A, where the history is noted, rigors occurred, there was an absence of jaundice, and there was a previous history of indigestion or biliousness.

The cause of death appears to have been an acute intense inflammation of the duodenum, and it seems probable, in view of the above experiments, that the infective or toxic agent was carried into the duodenum by the bile stream.

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² Weichselbaum, A.: "Phlegmonöse Entzündung des Duodenum," *Ber. d. k. k. Krankenhaus. Rudolph-Stiftung in Wien* (1885), 1886, p. 431.



RECENT WORK IN TROPICAL DISEASES.

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TRYPANOSOMIASIS.

SIR DAVID BRUCE, Major Hamerton, Capt. Watson, and Lady Bruce have investigated a trypanosome taken from horses and dogs supposed to be suffering from nagana, and sent to them by Dr. Theiler. The interest of this strain was that a large percentage of these trypanosomes showed *posterior* nuclear forms. This disposes of the contention that the so-called *Tr. rhodesiense* can be distinguished from other species of trypanosomes by this peculiarity, and first led the Commission to suspect that *Tr. rhodesiense* is in reality *Tr. brucei*.

An investigation of the living strain, which was subsequently obtained, showed that the pathogenic action of *Tr. brucei*, Zululand strain, 1913, on various animals is so similar, not only in regard to the symptoms during life, but also in the post-mortem appearances and rate of mortality, to that of the trypanosome causing disease in man in Nyasaland, that it affords another proof that these two trypanosomes are identical.

LEISHMANIASIS.

Laveran has shown that the virus of Indian kala-azar and the virus of the Mediterranean disease produce similar results in the monkey, mouse, and dog, and has thus proved the identity of the two parasites.

Row² finds that *cultures* of *Leishmania donovani* of kala-azar, like the virus, produce generalized infections in mice and monkeys, whereas cultures of *Leishmania tropica* of Oriental sore produce no lesions at all in monkeys, but may induce a generalized infection in mice.

Captain Mackie,³ I.M.S. gives a survey of kala-azar as it occurs in Nowgong, Assam. The natives commonly hold

that kala-azar is due to bad water, and the disease seems to be commonest in villages situated on rivers and rare in jungle villages. No particular connection can be traced between the disease and the prevalence of healthy or diseased dogs, or with any other animal.

The total average leucocyte count was 3,562 per cubic millimetre of which

30.7	per cent.	were	polymorphonuclears.
60.0	"	"	small mononuclears.
7.5	"	"	large mononuclears.
1.8	"	"	eosinophiles.

No drug was found to exert any influence on the course of the disease.

CHOLERA.

Greig⁴ has reported the finding of the cholera vibrio in the bile in one case, and in the lung in another case, of cholera. He has now investigated nine more cholera cadavers, and has isolated the vibrio from the lungs, spleen, kidney, mesenteric glands, and biliary tract. He states that he has cultivated the blood in a considerable number of cases of cholera with negative results so far. The vibrio appears to be distributed by the lymphatic channels and this may account for the difficulty of recovering the organism from the blood during life.

Greig⁵ also finds that cholera-like vibrios, so often associated with the true cholera vibrio in the stools, may likewise occur in the tissues associated with the cholera vibrio.

Greig⁶ has investigated the hæmolytic action of Indian strains of cholera and cholera-like vibrios. The hæmolytic capacity was tested in fluid media and on blood-agar, goats' red-blood corpuscles being employed. In the fluid medium, 333 strains of the true cholera vibrio were tested, all of which were non-hæmolytic in the conditions employed. On blood-agar, 161 strains were tested, of which one gave distinct, and nine gave a trace of, hæmolysis at the end of 24 hours. Of the cholera-like vibrios, 100 strains were tested in the fluid medium, of which 19 gave no hæmolysis, and 16 only a trace of hæmolysis, while the remainder gave more or less marked hæmolysis. On blood-agar, 43 strains of cholera-like vibrios were tested,

of which one only gave no hæmolytic test and one only a trace of hæmolytic test, the remaining 41 strains giving more or less marked hæmolytic test. The hæmolytic test would therefore seem to be a very valuable one for differentiating true cholera and cholera-like vibrios from each other.

Crowell⁷ has attempted the diagnosis of Asiatic cholera at autopsy. The following were the anatomical features on which a diagnosis is based: Acute catarrhal enteritis associated with (1) cyanotic finger nails; (2) dry tissues; (3) oligæmia; (4) dry and sticky peritoneum with pink serosa of ileum; (5) contracted and empty urinary bladder; (6) shrunken, dry spleen and liver; (7) acute degeneration of parenchymatous organs; (8) poorly coagulated blood; (9) absence of formed fæces; (10) presence of rice-water intestinal content; and (11) prominence of lymphoid tissue in the ileum. Of 92 cases in which the bacteriological diagnosis was positive, 87 cases were recognized by the anatomical features; five were returned as negative, and were cases of other diseases which had died as a result of cholera. Of seven negative cases, three were returned as possibly positive, and were cases of acute enteritis.

Barber⁸ contributes a paper on cockroaches and ants as carriers of the vibrio of Asiatic cholera. Cockroaches (*Periplaneta americana*), which have fed on human cholera fæces, may harbour cholera vibrios in their intestines; these may appear in enormous numbers in their fæces for at least two days after the insects have fed, and may occur in smaller numbers 79 hours after ingestion. By means of both fæces and vomit, cockroaches may act as carriers of cholera to human food. Cholera vibrios in cockroach fæces will survive on human food at least 16 hours after discharge from the insect, and cholera vibrios in human fæces will survive, in competition with numerous other bacteria, on food for at least four days. There is no loss of virulence for guinea-pigs of cholera vibrios after 29 hours' sojourn in the intestine of the cockroach. Cholera vibrios may be found in the bodies of ants at least eight hours after they have ingested cholera cultures or human fæces from cholera patients.

Greig⁹ has investigated the duration of life of the cholera vibrio in the stools; the stool was kept in a flask in a cupboard

at room temperature, the observations being made in Calcutta. In all, 94 stools were examined. The vitality of the vibrio is shortest during the hot season, March to June, and is longest in the cold season, December to February. The maximum duration of life was found to be just short of eight days (in February), and the minimum a little over one day (in June). Incidentally, the number of vibrios in the stools was determined in six cases; it ranged from 145,000,000 to 2,000,000,000 per cubic centimetre.

Simpson ^{9a} gives a good survey of the history of the invasions of Europe by cholera. He traces the course taken by the disease in various epidemics, and discusses the danger of cholera prevailing in the zone of hostilities in the present war next August. He enters an earnest plea for the use of prophylactic inoculation, of the value of which he gives statistics, and considers that Castellani's method of using a mixed vaccine of typhoid, paratyphoid and cholera is well worth trial as being practical and convenient.

DYSENTERY.

Captain Heffernan,¹⁰ I.M.S., discusses the ætiology of asylums dysentery in India.

Asylums or institutional dysentery, a disease well known in Great Britain and formerly designated "ulcerative colitis," is now recognized as being a form of bacillary dysentery.

During 44 months, 146 patients were attacked with dysentery out of a total of 1,205 patients under treatment in the Madras Asylum. The stools of all the cases were examined microscopically, and in 86 cases plate cultivations from the stools were made in addition.

The following list gives the results of the microscopical findings :—

Amœba coli	-	-	-	19
Amœba histolytica	-	-	-	5
Flagellates and ciliates	-	-	-	16
Balantidium coli	-	-	-	3
Ova of hook-worm	-	-	-	18
Ova of other worms	-	-	-	26

The bacteriological examination resulted in the isolation of some variety of the dysentery bacillus in 43 instances out of the 86 cases examined. It was found impossible to isolate

dysentery bacilli from fæculent stools; it was only from mucoid stools that success was attained, and then the mucus had to be repeatedly washed with sterile saline before plating, so as to remove every trace of fæculent matter and leave only a clean, sometimes bloody, mucus. McConkey's bile-salt lactose agar was the medium employed for plating. Although the dysentery bacillus was thus isolated, in only 43 out of 146 cases (86 only examined bacteriologically) the Madras Asylum dysentery may be regarded as being of the bacillary variety in practically all except in the eight cases in which amæbiasis and balantidiasis existed. Asylums dysentery in Madras, therefore, corresponds with asylums dysentery elsewhere, except that the Shiga strain of bacillus is more prevalent.

The measures taken for prevention were :--

1. The treatment of all dysentery cases in the isolation sheds.
2. The segregation and observation of convalescents for six months after recovery.
3. The incineration of the excreta of all dysentery patients and convalescents.
4. The boiling of drinking water.
5. Prophylactic inoculation of all patients exposed to infection.

For prophylactic inoculation, a vaccine was prepared with four Flexner strains and four Shiga strains of dysentery bacilli, isolated from stools of previous dysentery cases. It was standardized to a strength of 100 million bacilli per cubic centimetre, and a dose of 2 c.c. was given hypodermically twice, with an interval of about 10 days between the two doses. The results of the prophylactic inoculation are shown in the following table :--

No. of persons inoculated 533.

No. of persons not inoculated 130.

No. of inoculated attacked $34 = 6.4$ per cent.

No. of not-inoculated attacked 10 = 7.7 per cent.

The results of prophylactic inoculation, are, therefore, unsatisfactory. No ill-effects were noticed from the inoculations.

The general treatment of the dysentery was to give ʒii of a castor-oil emulsion, followed by ʒii of the same emulsion every three hours for the first 48 hours (the emulsion consisted of ʒii of castor oil in ʒi); saline treatment was not tolerated by these patients. In addition to castor-oil by the mouth, rectal lavage with boric acid solution followed by albargin (gr. iv to the pint), alternating with potassium permanganate solution, twice daily, was practised from the commencement of the disease. The solutions were left as long as possible in the bowel, the foot of the bed being raised on blocks 18 inches high, and the patient being made to lie on his right and left side alternately.

Serum treatment was tried in fifteen cases with good results, particularly in acute cases with fever, but several doses are necessary to produce a permanent effect.*

Many of the Madras cases either begin with conditions of glossitis and stomatitis, or develop these conditions during the course of the disease. The stools then become copious, frothy, and very offensive, and a condition indistinguishable from sprue becomes established. Iodine, internally, and Bulgarian sour milk have been tried for these cases, but as a rule the patients go on for months or years in a stuporose condition, swallowing large quantities of fluid nourishment and absorbing little. The final post-mortem reveals an alimentary canal thinned and denuded of epithelium from mouth to cæcum, with ulceration in the colon and sigmoid. Inoculation with polyvalent or autogenous vaccine was tried in 37 of these cases, but with very unsatisfactory results.

Willets¹¹ has made a study of intestinal parasitism, particularly entamœbiasis in patients of the Philippine General Hospital, Manila. He states that he is unable, from a microscopical examination, to make a differential diagnosis between *Entamœba histolytica* and *E. coli*, either in the active or the quiescent stage, but the two species can readily be distinguished in the completely encysted stage. The points of difference,

* See on this point abstract of Willmore and Savage's remarks in "Review of Tropical Diseases," THE PRACTITIONER, August, 1914, p. 228.

as given by Walker, are:—

<i>Entamæba histolytica.</i>	<i>Entamæba coli.</i>
1. Cyst smaller.	Cysts larger.
2. Cyst less refractive.	Cyst more refractive.
3. Cyst usually contains refractive bodies known as "chromidial bodies."	Cysts do not contain chromidial bodies.
4. Nuclei never more than four.	Nuclei eight, occasionally more.
5. Cyst wall thinner.	Cyst wall thicker.

In another paper, Willets gives a preliminary report on the treatment of entamœbiasis with ipecacuanha, emetin, and neo-salvarsan. The following is a summary of his results, in his own words:—

1. The 132 cases of entamœbiasis considered consist of 27 dysenteric and 105 non-dysenteric cases. The dysenteric cases are divided into 11 treated with emetin and 16 with ipecac; the non-dysenteric into 44 controls—34 treated with ipecac, 19 with emetin, and 8 with neo-salvarsan.

2. (a) Prophylaxis against the occurrence of entamœbic dysentery in an infected individual and against carriers of *Entamæba histolytica* consists in (1) making a differential diagnosis between *E. coli* and *E. histolytica* and treating only those infected with the latter species, or (2) treating all persons indiscriminately who are infected with entamœbæ.

(b) The exclusion of *E. histolytica* from an infection is impracticable for routine usage, because of (1) the experience required to make a correct differential diagnosis between *E. histolytica* and *E. coli*, (2) the time required for an experienced microscopist to make such a differential diagnosis, and (3) the frequency of *E. histolytica* in this locality.

(c) Prophylactic treatment should, therefore, be confined to expelling entamœbæ from the intestinal tract. In order that such a treatment may be widely used, it must be inexpensive, give good results quickly, and the method of administration must be simple and unattended by prolonged unpleasant reaction.

3. (a) Four preparations are now in use for entamœbiasis—ipecac, emetin, neo-salvarsan, and bismuth. Reports of each

and all of these treatments deal chiefly with their application to the symptomatic cure of dysenteric cases, whereas they should be applied also to the cleansing of the bowel of entamœbæ.

(b) Results obtained by Winn in dysenteric, and by ourselves in non-dysenteric, entamœbiasis with salvarsan and with neo-salvarsan indicate that this treatment may prove to be the most efficacious of the four varieties in quickly relieving the dysenteric symptoms, and expelling entamœbæ from the intestinal tract.

4. (a) Entamœbæ are very unequally distributed in a given stool, and in different stools from an infected individual. This makes it difficult to estimate the intensity of an infection, and to tell when a specimen is truly negative.

(b) More than three consecutive negative examinations are required, before one may state with safety that a person is free from entamœbæ, provided four cover-glass preparations be examined of each specimen.

5. Rest and diet influence the clinical evidences of entamœbic dysentery favourably, and our results in control cases tend to show that they are to be reckoned with in the elimination of entamœbæ from the intestinal tract.

6. Because of the recurrent nature of entamœbic dysentery, it is to be remembered that some apparently good clinical results will be obtained with any form of treatment.

7. (a)—In our dysenteric cases, emetin gave a larger percentage of symptomatic cures and acted quicker in this class of case than ipecac.

(b) Emetin and ipecac were about equally efficacious in expelling entamœbæ from the intestinal tract. The time required to expel the entamœbæ with the two preparations was also about equal.

8. In our non-dysenteric cases, neo-salvarsan freed the bowel of entamœbæ in 100 per cent. of cases, ipecac in 70·6 per cent. and emetin in 36·8 per cent. From the last two percentages an undetermined factor which is less than 25 per cent. must be subtracted, because this percentage of cases would have given two consecutive final negative examinations (an arbitrary standard adopted for comparative

purposes) in the time limits without treatment.

Musgrave and Sison¹² give an outline of the routine treatment of bacillary dysentery in the Philippine General Hospital. Absolute rest in bed is maintained, so as to save the strength of the patient. Some mild laxative is early administered, preferably sodium or magnesium sulphate, preceded by fractional doses of calomel. The administration of *simaruba officinalis* combined with some opiate is highly recommended. As an adjuvant to this treatment, the judicious use of normal saline solution as an enema, or given in the form of the drop method per rectum, in amount of one litre once a day, is sometimes very beneficial.

When the acute stage of the disease has subsided, enemata of hydrogen peroxide in weak solution (about 25 c.c. in 500 c.c. of water) once a day are a great help towards prompt recovery.

Ipecacuanha has not given universal satisfaction. While some patients are benefited by this drug, others cannot tolerate it. The use of astringents and so-called gastro-intestinal antiseptics have been given up as unsatisfactory.

The use of an ice-bag over the abdomen is a great help in diminishing the abdominal pain, and hot turpentine stupes are useful for the same purpose.

The essential part of the treatment is dietetic. During the first 24 hours of the acute stage, food must be withheld; pieces of ice are given to allay thirst. After this time, the patient is allowed albumen, rice or barley water, and later skimmed or peptonized milk. When improvement has begun, milk, broth, beef juice, and orange juice may be given. The mouth must be frequently cleansed.

Serum treatment has not given good results, probably because that employed was not homologous for the strains of the infection.

PLAGUE.

Bacot¹³ has investigated the length of time that fleas may carry living plague bacilli. He finds that fleas (*Ceratophyllus fasciatus*) are able to carry *Bacillus pestis* for periods up to 47 days in the absence of any host, and subsequently to infect a mouse. Infected fleas starved for 47 days and then placed upon a mouse may not infect it for a further period of about

20 days.

Bacot¹⁴ has also investigated the power of bugs to convey infection of plague. His experiments indicate that for a percentage of bugs (*Cimex lectularius*), and probably for all newly hatched ones, a meal of septicæmic blood from a mouse dying of plague is fatal. Bugs which are not killed by the infecting meal are capable of carrying *B. pestis* and reinfesting mice after a period of 48 days' starvation. The development of *B. pestis* within the crop of bugs differs generally from that which takes place in the stomach of the flea in respect of its slower and looser growth, this limitation of activity being accompanied by and possibly due to the preservation of the structural character of the blood for many days after its ingestion into the crop.

UNDULANT FEVER.

In 1914 Major Kennedy, R.A.M.C., called attention to the fact that the serum of five out of 22 English cows examined contained agglutinating substances for the *Micrococcus melitensis*: all attempts to isolate the organism from the milk were negative.

Major Cummins, Capt. Coppinger, and Lieut. Urquhart¹⁵ have since investigated the milk of seven cows from a London dairy for agglutinins; of these two gave positive results, and one of these was found to agglutinate *M. melitensis* in dilutions varying between 1 in 250 and 1 in 1,000 on different dates. The milk, whey, and serum of this cow all agglutinated the germ in corresponding dilutions. The agglutination does not depend on acidity, and the agglutinins were thermostable. The milk gave no agglutination for *B. typhosus*, *B. coli*, *B. dysentericæ*, and *M. paramelitensis*. The milk, whey, and serum all contained thermostable opsonins for the *M. melitensis*, while the milk of control, non-agglutinating cows had no opsonizing effect. The *M. melitensis* could not be isolated from the animal.

OROYA FEVER AND VERRUGA PERUVIANA.

Strong, Tyzzer, and Sellards¹⁶ describe the characters of Oroya Fever (Carrion's Disease), and discuss its relationship with Verruga. The opinion is expressed that the two diseases are quite distinct. The blood changes in Oroya fever are very intense, and are fully described; extreme anæmia and the

presence of the peculiar rod-shaped bodies within the red corpuscles (known as *Bartonella bacilliformis*) being the most important. The mortality is probably 30 to 40 per cent.

In the liver, spleen, bone-marrow, and lymph glands there is marked evidence of phagocytosis of red and white cells by the endothelial cells, which sometimes contain numbers of the *Bartonella bacilliformis*.

Attempts to transmit Oroya fever to animals were unsuccessful, but Verruga was inoculated on to monkeys through twelve successive series. No definite micro-organism could be detected, and the authors consider it not unlikely that the virus will prove to be a filter passer.

LEPROSY.

Johnston¹⁷ has cultivated from the spleen of two lepers an absolutely non-acid-fast streptothrix. The two strains were apparently identical, and were grown first on placental agar and fish-juice agar, requiring three or four weeks to develop; afterwards, they grow readily on glycerin agar. Rabbits and guinea-pigs were inoculated, and up to six months afterwards no lesions were found in the animals. One guinea-pig after seven months showed nodules in the liver, which here and there contained rounded masses distinctly acid-fast, but not showing definite bacilli. Cultures made from these gave a whitish growth consisting of acid-fast, short, long, and clubbed rods.

A second series of animals was inoculated as before, and one guinea-pig suffered from a purulent discharge from the eye which contained large numbers of acid-fast bacilli; cultures from this were negative. Other animals showed nodules in some of the organs in which a few acid-fast bacilli were present.

Johnston states that he is convinced that the *Bacillus lepræ* is the acid-fast stage of a markedly pleomorphic streptothrix.

TRICHONOCARDIASIS.

Trichonocardiasis, first described by Castellani, is an infection of the axillary or pubic hair by a mould, *Mocardia tenuis*. It has been met with in Ceylon, the Gold Coast, and the Sudan.

The organism, becoming implanted beneath the projecting

edge of the cuticular scales, grows outwards as well as downward, and laterally through the cuticular fibres, which become elevated, torn, and the hair-shaft finally breaks. The disease, *per se*, trichonocardia flava, shows a heavy nodose or ensheathing mass attached to the hair, having a bright yellow colour. The varieties are caused by associated cocci, which in the case of trichonocardiasis rubra, is *Micrococcus castellani*, and of trichonocardiasis nigra, *Micrococcus nigrescens*.

The disease shows as a heavy nodose or ensheathing mass attached to the hair-shaft, and having a bright yellow, red, or black colour. The excretions from the growth are slightly irritating to the skin and cause a slight inflammation, with itching over the infected areas. The underclothing is stained yellow, red, or black, as the case may be.

Johns¹⁸ describes a case occurring in a student of Tulane University, New Orleans. He suffered from a troublesome red, sweaty discoloration of the underclothing covering the axillæ, which accumulated to such an extent every day that he became alarmed. Microscopic examination, as well as cultural tests, disclosed a typical case of trichonocardiasis rubra. The presence in the infected regions of the hair-shafts of the mono-branched hyphæ of *Mocardia tenuis* was detected, with the typical chrome yellow colonies of *Micrococcus castellani* on a modified blood-agar medium, that later developed the yellowish-red pigment characteristic of this coccus, as described in detail by Chalmers and O'Farrell. The student had never noticed the condition before the onset of warm weather in April of this year, and very probably acquired the infection in the wards of Charity Hospital, where, in the course of the physical examinations on patients required of the students, the axillary and pubic regions of many patients are palpated or percussed, thus giving chance for finger-nail contamination.

The presence of this disease so far removed from the hitherto described habitat would indicate at least a world-wide distribution in tropical and sub-tropical climates.

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POISONING BY DATURA AND HYOSCYAMUS.

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THE Kasr-el-Ainy, being the only Government Hospital in the big town of Cairo, receives a large number of unconscious people found in the streets. Of these, datura poisoning comes next only to acute alcoholic intoxication; three cases may be in the hospital at one time.

HOW TAKEN.

Datura is taken either as leaves or seeds, more often the latter. The leaves of *Datura alba* and *fastuosa* are mistaken for Riein leaves, and the seeds for wheat; they are taken intentionally as well as an intoxicant, and are given by others to facilitate robbery, but for this purpose other drugs are generally added, such as hasheesh or aconite.

Hyoscyamus, as seeds or leaves, is less commonly used. In one case more than 600 seeds were identified in the stools.

INCUBATION PERIOD.

Patients are in the habit of saying that they lost consciousness immediately after partaking of a meal or after being given dates to eat by some passer-by, but careful questioning shows that an interval, varying from ten minutes to two hours, has always existed. One patient walked six miles after taking dates, before he fell down and was picked up by the police. The amount of food taken with the drug and the addition of drugs and other substances influence the onset of symptoms.

SYMPTOMS.

Two types of cases can be distinguished: (1) the *maniacal*; (2) the *comatose*. The first is more apt to occur when the seeds have been taken on a full stomach, and the latter with the leaves.

(1) MANIACAL FORM.—The patient, on admission, is found

to be boisterous, talkative, and inattentive ; he tells stories of voyages which have never happened, the voice being hoarse, and speech incoherent. There is impulsiveness of action, but no tendency for the various senses to react to outside stimuli. The patient apparently is absorbed in one idea, and his movements are in accordance. In the absence of attendants, he will try to take hold of imaginary objects. He is, however, destructive, and will beat anybody he can get hold of, though every now and then there is a period of timidity. There is no perversion of sentiments or feelings, and no sexual indulgence. Attacks of delirium occur especially at night, and are of an exhilarating nature. He is often laughing, joking, and shouting, but hallucinations and illusions are uncommon.

The *face* is slightly flushed, eyes congested, skin generally hot and dry ; in only one case was there a flush. Injections of pilocarpine, 5 m., may fail to cause diaphoresis.

Temperature.—On admission, this is low, probably from collapse and exposure, but it soon rises, and continues for 24 to 48 hours. The highest was 39.2° C. in the axilla. It has no relation to the degree of intoxication, and a severe case may show a normal temperature all the time.

Urinary.—There rarely is any retention on admission, but 2–3 days afterwards the catheter may have to be used for a day or two, 6-hourly. The amount seems to be diminished at first, but subsequently there is diuresis with a low sp. gr. urine. No abnormal constituents are found in uncomplicated cases.

Gastro-intestinal.—There is seldom epigastric pain or any gastric disturbance, even when the drug was taken with very little food. Constipation is, however, constant, and the action of the bowels, for some days or even two weeks, may have to be secured by drugs. In none of the cases was there any abdominal pain or colic.

Pulse.—This is always rapid, averaging 110–120 per minute, the lowest being 84, the highest 140. The rapidity of the pulse seems to be the only index of the degree of intoxication, if allowance be made for other disturbing factors, *e.g.*, ankylostomiasis with its fatty heart, or valvular heart disease, or chronic interstitial nephritis. In the last instance, with an hypertrophied heart, a normally high tension, and a slow pulse (50–60), the rate was raised under the influence of the drug to

86, but fell again after a week. Tension of the pulse was always lowered, with a tendency to dirotism. A pulse of 120 coincided with a blood-pressure of 80 mm. Hg.

Other Signs.—The pupils are dilated and sluggishly mobile; the iris may seem to disappear. Chronic iritis is, however common, and a contracted pupil may be diagnosed, but irregularity of outline may help. Dilatation may persist for two weeks. The tongue is dry and tremulous, and the throat is congested, but there is no special smell about the patient.

Progress of the Case.—The patient may remain from two to three days in this condition, and the improvement, which is rather sudden, is surprising to the attendants. A patient, who a few hours before was pacing the room laughing and shouting, is now fairly quiet with a sense of fear, and is confused mentally. He is afraid of being touched, handled, or interfered with in any way, and sits in one corner of the room with a suspicious look. He is pleased if left undisturbed, and if patience is taken, may answer some questions, *e.g.*, say his name, where he comes from, and where he lives.

Many of the physical signs have by now disappeared, and, except for his mental instability, the patient would have been discharged. The return to normal is slow, and it may be another two or three days before he thoroughly recognizes where he is and asks for discharge; it is evident that perception and memory are defective, and there is want of power of attention. In bad cases, from four to six days more may be necessary before the patient is finally discharged. The memory may remain affected for some weeks, in one case two months. No permanent moral or mental defect was left in any of the cases. As all those admitted to the hospital are of the lowest class mentally, and the majority lack any brain exercise, it was difficult to test with accuracy any changes in the higher faculties. In a private case, inability to control himself in more than one way, such as cruelty to his wife and children, etc., persisted for over a month.

(2) COMATOSE TYPE.—The patient is unconscious on admission, the degree varying from one of mild stupor to the most profound coma with loss of conjunctival and corneal reflex. The face may be cyanosed if coma is deep, but never

to the extent seen in opium poisoning. The pupils are dilated and inactive. The skin is hot and dry. The temperature and pulse are as in the maniacal form, the pulse having the same significance of being directly related in rapidity to the degree of coma. Respiration may be rapid, but in half the cases, slow and deep (air hunger), with stertorous breathing in later stages. Cheyne Stokes respiration, so common in late opium poisoning, was met with in only one case lasting a quarter of an hour, the case being by no means a bad one. The heart, though normal after recovery, had an extra systole, the origin of which was not investigated.

Retention of urine is uncommon in this stage, although quite common during recovery.

Motor System.—The limbs feel rigid, unless the patient is dying. The knee and elbow are flexed, and motor movements, varying from simple spasms to irregular bilateral clonic convulsions, occur. One side may be more active at one time, but the other side soon begins, making it evident that the affection is general; the movements closely resemble those of uræmia or eclampsia. The head is sometimes retracted, simulating meningitis. The reflexes are all exaggerated, and ankle clonus may be present. Babinski's sign was obtained in one case, which proved on recovery to be one of early senile paraplegia.

Progress of the Case.—On washing out the stomach, the immediate improvement, seen in acute alcoholic intoxication, is not obtained. The patient may appear worse for a time, but the condition, however, slowly improves. Clonic convulsions become less frequent and coma less deep, but it may be a day or two before shouting in the ear rouses the patient, and pricking the skin gives a response. In the meantime, he lies in a true comatose state unaffected by all outside impulses. Breathing tends to be easier, and pulse and temperature to diminish. There is a superficial resemblance to cerebral apoplexy, for which it is often mistaken in outside practice. This passes gradually into a stage of drowsiness and confusion. The patient becomes giddy on sitting up, and prefers to lie undisturbed. As night approaches he may get delirious and irritable, and pick at imaginary objects; his eyes are closed, and the tongue is tremulous. He seldom passes into a stage of severe cerebral irritation, or shows the maniacal symptoms already described.

He is weak and easily controlled. The limbs remain rigid and weak, and their recovery seems to be a slower affair than the mental ; a patient may be able to answer simple questions while yet unable to stand.

Prognosis and Variability of Symptoms.—No two cases of datura poisoning are alike. Cases that seem to be so on admission disappoint the prognostician, for one may clear up by the next day, while the second takes a week or more. With the exception of a dilated pupil and an increased pulse-rate, none of the signs seems constant. I have seen cases with subnormal temperature throughout, others with coma and absence of convulsions, and others with marked cyanosis apparently cardiac in origin. A moist skin was met with in two cases : in one, aconite had certainly been added to the drug ; in the second, this was strongly suspected. I have not seen a fatal case, though many on admission were and remained for some hours on the verge of death.

Diagnosis.—In simple cases presenting typical symptoms, there is no difficulty, but others test every effort, and the diagnosis may remain doubtful for several hours in spite of everything being taken into consideration. *The maniacal type* has to be diagnosed from—

- (a) Bell's disease (acute delirious mania) by (1) the history when it can be obtained, *i.e.*, appearance of symptoms after taking a meal, etc. ; (2) dilated pupils ; (3) No reaction from the various senses to external stimuli, no perversion of sentiments ; (4) temperature higher.
- (b) Hasheesh poisoning. In this hallucinations and illusions play a great part. Temperature, pulse, and pupils are different.
- (c) Acute alcoholic intoxication. In addition to other signs, I consider the marked improvement after washing out the stomach of importance, especially when this is efficiently performed.
- (d) Delirium of fevers. The tongue is generally coated in these, and the pulse rate rises in accordance with the temperature and respiration.

The comatose type may be mistaken for any of the causes

of unconsciousness. I only deal with the more common ones, and chiefly those for which the poison was actually mistaken, though only for a short period.

- (a) Cerebral vascular lesions. *Cerebral apoplexy* is a common mistake. My plan in all cases of coma is to look first for a unilateral lesion, *e.g.*, a contracted or a dilated pupil on one side, a local paralysis or spasm, deviation of head and neck, and the plantar extensor response on one side. The bilateral character of the lesion is an important argument against extensive cerebral hæmorrhage, but one must be ready to diagnose a contracted pupil secondary to iritis, or a paralysed limb with contracture resulting from an old lesion.

A slow high-tension pulse does not occur in datura poisoning. It is true that in the late stages of cerebral apoplexy the pulse may be rapid and tension low, but that is then a sign of failing circulation through the medullary centres, and it is accompanied by cyanosis and stertorous breathing. A lumbar puncture may reveal increased tension in the cerebrospinal fluid, as well as blood if the hæmorrhage has invaded a ventricle.

- (b) Opium poisoning. The typical pin-pointed pupils are of great help, but in a country where glaucoma, with its dilated pupils, and trachoma, with pannus obscuring the pupils are so common, the examination of the eye may be of no value. The absence of convulsions, a moist skin, and a low temperature may help; the pulse is slow at all periods of opium poisoning.
- (c) Cerebro-spinal meningitis. In datura poisoning, the head may be retracted, the limbs rigid, and temperature high, so that a comatose patient may be mistaken for one with meningitis. In the latter, the coma is rarely deep, convulsions are absent, cranial nerves may be affected, and the pulse is slow compared with the temperature. My plan is, however, to make a lumbar puncture in all cases, even when there is very little suspicion of anything else but

the poisoning.

- (d) Concussion may be mistaken for mild cases of poisoning, and *vice versâ*. In addition to other signs, the rapidity of the pulse has no relation to the conscious state, but in datura cases it is an index of the toxicity. The tension in concussion is much lowered. Vomiting does not occur in datura poisoning.
- (e) Siriasis is excessively rare in Egypt, if it ever occurs. I have not seen a case, certainly not one with hyperpyrexia, coma, etc. Heat-exhaustion and sun-traumatism are common enough, but the diagnosis is rarely in doubt. Symptoms like vomiting, headache, and giddiness are marked, but the condition rarely passes beyond one of stupor.
- (f) Uræmia. Cases of uræmia occurring in the course of acute nephritis or chronic parenchymatous nephritis are easy enough to diagnose, but uræmia in the course of chronic interstitial nephritis may easily be mistaken for datura poisoning, especially as half of the cases are old people, many of whom suffer from granular kidneys. Cardio-vascular changes and retinal degeneration may be characteristic of the kidney condition, but the estimation of urea in the cerebro-spinal fluid was necessary in one case to prove the nature of the fits.

TREATMENT.

In all cases, whether the diagnosis is certain or in doubt, the stomach must be emptied, and 30 grs. of sulphate of magnesia, or in robust subjects one drop of croton oil, left in.

When poisoning is fairly certain, I give inject. hypoderm. morph. 4 m., and inject. hypoderm. pilocarpin. 5 m. (P.B.), which is repeated as often as six-hourly in severe cases. Pilocarpine should not be given—

- (1) To old people, for instead of causing diaphoresis it seems to favour œdema of the lungs.
- (2) When there is already some bronchitis or lung affection.
- (3) Whenever the first dose or two is not attended by

action of the skin and a lowered temperature. I believe that it is the only real antidote, morphia being useful in relieving convulsions and allaying excitement.

The patient should remain in a dark room, be kept on a light diet, and given purgatives freely, for seeds of the plant have been recognized in the fæces on the morning of the fourth day. An ice-bag is applied to the head, and a paraldehyde draught or veronal cachet (0·30) may be necessary to procure sleep.

Cases which resemble apoplexy, and in which the diagnosis remains doubtful for some time, should be treated cautiously. The stomach tube, if used carefully, should cause no ill effects. Morphia should not be given, for it tends to cause cerebral congestion, and hence is harmful in a case of apoplexy. Hyoscine is equally prohibited, for the case may possibly turn out to be one of datura or hyoscyamus poisoning.



THE TREATMENT OF TROPICAL ULCERS.

By S. VASSALLO, M.D.

Medical Officer, Leeward Islands.

ULCERS in the tropics are a very common occurrence, and constitute one large item of the minor cases one is called upon to treat. It would be rather difficult to assign a cause for these ulcers, as so many factors are present, which have all to be taken into account. As a general rule, they are most frequently met with in the lower part of the leg and in the feet, and very seldom on the upper extremities.

They arise from trivial causes, a bruise or a knock being sufficient to start them. Once started, they progress rapidly, so that, in a week or ten days' time, they may attain the size of half-a-crown or even larger. They are often multiple, a new one starting just by the old one.

The slight traumata which originate them seem to show that the individual resistance is very low. This is perfectly true, and is not surprising when one remembers the way these people herd together, and the food they eat; besides, it seems that the majority have a syphilitic taint, and if to this are added chronic malarial and filarial infections we have the multiple factors which go to produce these ulcers.

The diagnosis is very easy; the ulcers are more or less round, with an anæmic, fibrous margin, and the surface studded with yellow points indicative of disintegration of tissue. When this disintegration proceeds rapidly, they become offensive and slough, pus being formed. They are very painful. Left alone, they keep on increasing; the patient loses weight, becomes anæmic, and is not fit for any work at all.

As regards the treatment, the usual antiseptics and astringents are more or less useless; if, however, the ulcer is offensive and purulent, a preliminary course of warm lysol or permanganate (1 per cent.) lotions is useful to clean them thoroughly. The treatment, in any case, must be active, and much depends on the appearance of the sore. If it is small, salvarsan is very effective, if larger, skin-grafting. With respect to skin-grafting, not all cases are suitable; in those with big, old

ulcers if skin-grafting is attempted, it is sure to fail, because in these the floor of the ulcer contains a lot of fibrous tissue, and therefore granulation with subsequent vascularization is unable to take place. Even if scraping precedes the operation, some fibrous tissue is sure to be left, which handicaps the healing process. Every ulcer which is skin-grafted must first be scraped, till a little free blood oozes from every part of the surface. Without this preliminary scraping the graft will not take. Where there is much fibrous tissue around the margins, this should be dissected away all round, till a fresh healthy surface is obtained. All these details are essential for a successful graft. In other cases, the floor of the ulcer is filled up with proud granulation tissue, which must be scraped away as well. An ordinary scalpel makes quite an efficient scraper. The best cases for grafting are those in which the ulcers are of medium size and with not much fibrous tissue. The procedure does not in any way differ from that usually seen in surgical procedures; the skin is taken from the thigh, over the fascia lata, put in a warm saline solution, is trimmed and then put on the raw surface of the ulcer. Great attention should be paid to the dressing of the grafted ulcer, and it is essentially important that the graft should not move in the very least when the protective dressing and bandage is put on.

The use of salvarsan is generally followed by very good results, the ulcers healing rapidly under its action; this affords further proof of the specific nature or element of the ulcers. The dose varies from .3 to .6 gm., according to the age, .3 being used for all cases under 15 years of age. The effect in some cases is only temporary, the ulcer breaking down again rather badly. In these cases, a further dose, with an interval of from one to three months, may be needed. The reason for this breaking down is, probably, that the low vitality of the tissues asserts itself when the "606" is eliminated. This low vitality is so evident in some cases, that the site of the injection develops into an ulcer.

It is very desirable, then, that in bad cases, a preliminary course of mercury and iodides should be given. This should last from two to three months, according to the general health of the patient, and after this course, the action of the salvarsan is more lasting and effective. The injection, as usual, should be made in the gluteal region or intravenously.

Practical Notes.

TREATMENT OF COMMON RESPIRATORY AFFECTIONS.

Coakley recommends the following sedative combinations for use in acute and chronic inflammations of the mucous membranes of the respiratory passages, especially those accompanied by a sensation of rawness or tickling in the pharynx and a persistent cough.

- (1) ℞ Terpini hydratis - - - - - gr. ij.
 Ammonii chloridi - - - - - gr. j.
 Extracti Glycyrrhizæ - - - - - gr. js.
 Pulveris Ipecacuanhæ
 Codeinæ - - - - - ana gr. $\frac{1}{10}$

Misce. Fiat trochiscum.

Sig. "One lozenge to be taken every hour or two until the tickling and cough cease."

- (2) ℞ Ammonii Chloridi - - - - - gr. ij.
 Pulveris Ipecacuanhæ - - - - - gr. $\frac{1}{4}$
 Extracti Scillæ liquidi
 Extracti Senegæ liquidi - - - - - ana ℥ j.

Misce. Fiat trochiscum.

"One to be taken every hour."

- (3) ℞ Phenolis - - - - - gr. $\frac{1}{40}$
 Mentholis - - - - - gr. $\frac{1}{80}$
 Olei Sassafras - - - - - ℥ j.
 Pulveris Acaciæ
 Sacchari lactis - - - - - ana q.s.

Misce. Fiat trochiscum.

The last is useful for the foul breath associated with syphilitic and atrophic affections of the pharynx and larynx.

The following are used to increase the activity of the glands of the pharynx and larynx, in cases in which dryness of the throat and hoarseness are present.

- (1) ℞ Potassii Chloratis - - - - - gr. ij.
 Extracti Eucalypti liquidi - - - - - ℥ j.
 Pulveris Cubebæ - - - - - gr. $\frac{1}{4}$
 Sacchari lactis - - - - - q.s.

Misce. Fiat trochiscum.

Sig. "One to be taken every one or two hours."

(2) R	Mentholis	-	-	-	-	-	gr. $\frac{1}{35}$.
	Acidi Benzoici	-	-	-	-	-	gr. $\frac{1}{12}$.
	Olei Anisi	-	-	-	-	-	℥ $\frac{1}{80}$.
	Eucalyptolis	-	-	-	-	-	℥ $\frac{1}{15}$.
	Sacchari lactis	-	-	-	-	-	q.s.

Misce. Fiat trochiscum.

Sig. "One to be taken every one or two hours."—(*New York Med. Journ.*, 10 April, 1915.)

TREATMENT OF DIARRHŒA WITH CHARCOAL

Paul Ravant recommends a method of giving charcoal (wood) for diarrhœa in a paste, which he has been using at the front. The charcoal is obtained by extinguishing the embers of glowing wood with water, and reducing them to powder in a mortar.

Powdered charcoal	-	-	-	12	tablespoonfuls.
Powdered bismuth	-	-	-	4	"
Paregoric	-	-	-	1	"
Syrup	-	-	-	-	sufficient to make a paste.

From one to three teaspoonfuls of this are given daily. The paste should be kept in a pot or a tin box.—(*Journ. des Praticiens*, 24 April, 1915.)

TREATMENT OF GASTRIC AND DUODENAL ULCERS.

Max Einhorn recommends that patients who do not suffer much, do not present many symptoms, and go about their business, should be given large doses of bismuth. He considers it to be one of the best remedies in all forms of gastric or duodenal ulcer. Half a drachm should be given three times a day with 6 or 8 grains of calcined magnesia. The diet should consist of milk, eggs, cereals, and a great deal of butter; not too much meat, no heavy foods, no salads, nothing sharp, nothing peppery, and no ice-water. The patient should lie down for half-an-hour after taking the bismuth, or, if this does not do, apply a wet compress over his abdomen at night to act as a kind of sedative. If the pain is very pronounced, gr. $\frac{1}{120}$ th of atropine should be given in addition once or twice a day for a short period only.

In the case of large hæmorrhages, the patient must be put to bed and the body and stomach kept absolutely at rest. An ice-bag should be applied over the stomach, and all kinds of food and drink forbidden. For medicine, from 5 to 10 drops of adrenalin solution should be given in water, and a tablespoonful of a 10 per cent. solution of gelatine, which acts as an hæmostatic, can be taken three or four times a day. Hypodermic injections of horse serum are of benefit, and emetin hydrochloride, given in half-grain doses by hypodermic injection once or twice a day, has been found most useful in severe hæmorrhage. Severe pain is controlled with an opium and belladonna suppository.

No nourishment is necessary for the first day or two, but fluid must be supplied by sugar enemata twice a day. Two tablespoonfuls of glucose

should be added to one pint of water or of normal saline, and this is allowed to run slowly into the rectum. Rectal feeding should be begun later, and can be kept up for a week. The bowel must be washed out daily with water. After the fifth day, feeding by the mouth can be started, beginning with one tablespoonful, every hour, of strained barley water or milk and barley water. All going well, this quantity is doubled each day until six ounces are reached. The interval is then increased to two hours, and the quantity to seven or eight ounces. The next addition is raw eggs, beaten up in milk, until between two and three weeks after the hæmorrhage eight eggs a day are being taken. The bismuth treatment must be started as soon as regular feeding begins. When the rectal feeding cannot be tolerated, it will be necessary to institute duodenal feeding, which ensures absolute rest to the stomach.

The indications for operation are perforation; recurrent profuse hæmorrhages; frequent small hæmorrhages; constant hyper-secretion, accompanied by intercurrent ischochymia; severe pains not influenced by repeated medical treatment; stricture of the pylorus; ulcer with tumour-formation and suspected malignancy.—(*Canadian Med. Assocn. Journal*, February, 1915.)

APPETIZERS IN DYSPEPSIA.

Félix Ramond discusses the use of these in the treatment of dyspepsia. Those most in vogue are the *bitters*. These have no effect upon the mucous membrane of the stomach, when brought directly into contact with it; when placed upon the tongue, however, they set up an abundant salivary secretion, which is often followed by a reflex effect upon the stomach, inducing some gastric secretion. The bitter should, therefore, be given in the form of a draught, to make sure of contact with the tongue. Pills and capsules are not a suitable form for administration, little or no effect being produced on the tongue. According to Reichmann, the best time to take bitters is from fifteen to twenty minutes before a meal. Those chiefly used are nux vomica, gentian, quassia, calumba, condurango, aniseed, cascarrilla, and cinchona. Trousseau chiefly used quassia. Bourget gives, just before meals, from twenty to thirty drops of compound tincture of cinchona, or of a mixture composed of equal parts of compound tincture of cinchona, tincture of gentian, and tincture of quassia, or else of the liquid extract of condurango. Rigal advises taking, five or ten minutes before meals, from five to ten drops, in a little water, of the following:—

R. Tincturæ Nucis Vomicæ - - - part j.
 Tincturæ Gentianæ
 Tincturæ Cascarrillæ - - - ana partes ij.
 Misce. Fiat mistura.

The effect of *Alkalies* is a moot point. Hayem and Reichmann have no faith in them, Mathieu and Laboulais are doubtful, whilst Gilbert, Binet, and particularly Linossier and Lemoine look upon them as most effective. It is a fact, that at Vichy the patients quickly improve in appetite. Linossier gives an alkali one hour before the meal, Gilbert only half-an-hour. The dose varies from 1 to 5 g. Bourget advises,

half-an-hour before a meal, a claret-glass full of Evian water, in a bottle of which has been dissolved a packet containing:—

℞ Sodii Bicarbonatis	-	-	-	-	3ij.
Sodii Phosphatis	-	-	-	-	3j.
Sodii Sulphatis	-	-	-	-	3ss.

Misce. Fiat pulvis.

Ramond prescribes—

℞ Sodii Bicarbonatis	-	-	-	-	3ij.
Sodii Phosphatis					
Sodii Citratis	-	-	-	-	ana 3j.

Misce. Fiat pulvis.

This is dissolved in a litre of water.

Hayem adds a little sodium chloride, the action of which has given rise to many discussions since the part it takes in the production of hydrochloric acid has been known.

Natural or artificial gastric juice given before a meal usually yields good results, but its effect quickly wears off.—(*Journ. de Méd. et de Chir. prat.*, April 10, 1915.)

FOR STOMATITIS.

℞ Phenolis	-	-	-	-	-	mviiij.
Sodii Bicarbonatis	-	-	-	-	-	3ij.
Glycerini	-	-	-	-	-	3iv.
Aquam	-	-	-	-	-	ad 3iv.

Misce. Fiat mistura.

"For use as a mouth-wash."—(*Canada Lancet*, March, 1915.)

FOR IMPETIGO OF THE SCALP IN CHILDREN.

Bonifas recommends the plentiful application once a day of the following ointment:—

℞ Iodoformi	-	-	-	-	-	gr. xv.
Vaselini Acidi Borici	-	-	-	-	-	3ij.

Misce. Fiat unguentum.

The crusts soon become loosened and fall off; the hair then grows more thickly and strongly. In severe cases, the amount of boric vaseline should be reduced to one ounce and a half; in obstinate cases, the quantity of iodoform may be increased three- or four-fold, and the head must be washed very thoroughly with plenty of soap. Any lice present are killed at once. The very objectionable smell of the preparation may be masked by adding thymol in the proportion of 4 grs. to every 15 of iodoform used. This set causes a certain amount of smarting, but it soon passes off. The addition of thymol does not appear to increase the effect of the preparation.—(*Journ. des Praticiens*, 24 April, 1915.)



Reviews of Books.

Squire's Pocket Companion to the British Pharmacopœia. By PETER WYATT SQUIRE. Pp. xvi + 1040. Second Edition. London: J. and A. Churchill. Price, 10s. 6d.

THE *Pocket Squire* is now almost as well known as the *Squire's Companion* which is co-eval with the *British Pharmacopœia*. Perhaps no commentary on any pharmacopœia has been so thoroughly comprehensive and generally satisfactory as the *Companion*. Its very virtues, however, have interfered somewhat with its usefulness as the medical man's hand-book in the consulting room. Mr. Squire realized this fact many years ago, and then condensed the *Companion* in such a way as to provide what the working practitioner needs daily, namely, a book containing information as to all the best remedies, official, and non-official, as well as the best means for exhibiting them to his patients. This second edition has incorporated in it the additions to the new pharmacopœia, and contains a systematic and exhaustive review of that work in the new monographs which now find a place in the *Pocket Companion*. The prescribing notes are an important feature of the book; they have been thoroughly revised and much enlarged. The special chapter on "Therapeutic Agents of Microbial Origin" has been largely re-written by Professor R. Tanner Hewlett, and contains sections on "Therapeutic Sera," "Tuberculin," "Opsonins," and "Vaccines." The therapeutic notes extracted from the chief medical periodicals are very useful and so compendious and succinct as to furnish the maximum of assistance to the inquirer without overburdening the book. There is an independence of treatment and of information in *Squire* that one has come to look upon it as a most trustworthy guide concerning everything that has to do with the administration and properties of medicines. In the matter of solubilities it is eminently reliable. The determination of solubility figures has been a branch of pharmacy the Squires have made their own. We should particularly like to know, therefore, if it is quite certain that the solubility of the alkaloid cocaine is only soluble in olive oil to the extent of 1 in 50, because the B.P. gives it as 1 in 24. We have noticed one or two literal errors, such as Kava Rhizoma (p. 503), and pastil (p. 1), although it is spelt pastille elsewhere. The great variety of the contents of the *Pocket Companion* may be gauged by the fact that the index occupies seventy pages printed in double columns. This work is now more essential than ever; we cannot praise it more highly.

Elements of Pharmacy, Materia Medica and Therapeutics. By SIR WILLIAM WHITLA, M.A., M.D., LL.D. Tenth Edition. Pp. xii + 680. London: Baillière, Tindall and Cox. 9s. net.

THIS book is so well and widely known as to make it almost unnecessary to again bring to the notice of our readers. The new edition, however, has

been brought into accord with the new pharmacopœia, and changes are to be found upon almost every page of the book. The author, therefore, says that "this volume may be regarded as a new book." On the other hand, we should like to say that the arrangement of the book is altogether on the same lines as before. The manner in which so large a body of information is arranged has been praised again and again, and has proved its usefulness to scores and hundreds of students and practitioners. Its every feature displays the thorough grasp of subject matter and powers of exposition which are desired by every teacher and possessed by very few. Sir William Whitla's manual is a model of what text-books should be if they are to become the constant companions of the men who have the good fortune to be introduced to them in the initial stages of their career. It is well printed, well bound, and maintains the high reputation of the publishers.

Materia Medica, Pharmacy, Pharmacology, and Therapeutics. By W. HALE WHITE, M.D. Fourteenth Edition. Pp. xii + 712. London: J. and A. Churchill. 6s. 6d. net.

THIS edition is practically in all respects the same as the last one, which only appeared last year, with the exception that all the numerous changes required because of the recent issue of a new pharmacopœia have been thoroughly incorporated in the volume. The preface contains a summary of the pharmacopœial alterations. The characteristics of this book are so well known, and so well appreciated, as is shown by its having reached a fourteenth edition in twenty-two years, that it seems a work of supererogation to attempt a review of it. We have, however, thoroughly tested it with a view to seeing whether it is brought quite up-to-date and we have not found it to fail us in any single instance. There is a good account given of the more generally known sera and vaccines, and a large number of non-official remedies are treated of in conjunction with the pharmacopœial articles possessing similar properties. We are sure that this edition will maintain the continuous popularity of this well-known manual.

The Extra Pharmacopœia. Sixteenth Edition. Revised by W. HARRISON MARTINDALE, Ph.D., F.C.S., and WYNN WESTCOTT, M.B. Lond., D.P.H. Two volumes. Pp. Vol. I., xl + 1113; Vol. II., viii + 469. London: H. K. Lewis. Price, Vol. I. 14s. net; Vol. II. 7s. net.

THE new edition of the British Pharmacopœia could not certainly be considered to be in any way complete, until the new "Martindale" appeared. This has been forthcoming with commendable promptitude, although fully expected, for never yet has this tried and valued guide, philosopher, and friend been found wanting in anything that concerns therapeutic matters of all kinds and descriptions. As always, no pains or trouble have been spared to bring into the book the latest available and trustworthy information on every point, although, incidentally, this has necessitated the re-writing of practically the whole of the first volume. It is, we believe, a labour of love and a point of honour with the authors to keep their work in the full flood of modern knowledge. We have all of us long been grateful

to them, and each new edition increases our indebtedness manifold.

"And still they gazed, and still the wonder grew
That one small book could carry all they knew."

Materia Medica and Therapeutics. By J. MITCHELL BRUCE, M.A., LL.D., M.D., F.R.C.P., and WALTER J. DILLING, M.B., Ch. B. Tenth Edition. Pp. xiv + 645. London: Cassell & Co., Ltd. 6s. 6d. net.

THE appearance of a new pharmacopœia has necessitated the preparation of a new edition of this very popular handbook. The authors have taken the opportunity not only to incorporate all pharmacopœial changes, but to include as well the confirmed additions to our knowledge of pharmacology which have resulted from the investigations of recent years. For the most part the plan of the book is unchanged. Experience has proved it so satisfactory for teaching purposes, and so convenient for purposes of reference, that it would be difficult to improve upon it. We notice some changes however, which are worth calling attention to. The table of contents has been extended so as to display the groups of therapeutic agents. This is an improvement. A notable addition is an entire section, of 16 pages, on "Pharmacy and Dispensing," which treats of the making of mixtures, powders, pills, emulsions, suppositories, plasters, etc. In the last edition the Vaccines were dealt with in an appendix; they now appear in the body of the book and occupy the chief portion of "Group II—Drugs acting on the Blood and Metabolism." The abandonment of the older method of arranging the materia medica in natural orders, and the adoption of the better plan of forming pharmacological groups, have not only led to the new placing of organotherapy, but have made a radical change in the order in which most drugs now appear in the volume. It is a matter of the greatest importance that the student's attention should be directed to the pharmacological and therapeutical aspects of materia medica. The changes we have mentioned will be cordially welcomed, and stamp this volume as being worthy of the confidence which teachers, practitioners, and students have accorded to it throughout the years of its existence. The work is well printed on good paper, is well bound, forms a compact and handy volume, and we have pleasure in recommending it as a reliable and comprehensive text-book.

The Book of Pharmacopœias and Unofficial Formularies. By E. W. E. LUCAS, F.I.C., F.C.S., and H. B. STEVENS, F.I.C., F.C.S. Pp. viii + 524. London: J. and A. Churchill. 7s. 6d. net.

THIS work presents in a comparative manner the formulæ contained in the *British Pharmacopœia* and the national pharmacopœias of the United States, France, Italy, and Germany, as well as those in a number of unofficial formularies such as the *British Pharmaceutical Codex*, the chief hospital pharmacopœias of London, the national formulary of the United States, *Squire's Companion*, and *Martindale's Extra Pharmacopœia*. There are about five thousand formulæ. The preparations are arranged in pharmaceutical classes: *Aceta*, *Aquæ*, *Collodia*, *Decocda*, etc. Each article is treated of under the heading of its common Latin name as used in this country; but the names applied to it in other countries appear as synonymous. The

authors have taken much trouble to work out the weights and measures, as given in the different volumes, in such a way as to give the compounder the greatest assistance in making the preparations. In order to convey a good impression of the great amount of material dealt with, we may say that there are 30 pages devoted to *liquores*, 22 to *pilulæ*, 28 to *syrupi*, 36 to *tincturæ*, and 36 to *unguenta*. There is a chapter on the different processes employed in making galenical preparations. A useful table gives the French, German, or Italian name of articles of *materia medica* with the English equivalent. There is also a large and useful index. For the most part the cross-references are well done, but in a few cases they might have been extended with advantage. Primarily, this book is intended for pharmacists. We think that there are not a few medical men who will be pleased to have it on their shelves, especially if they are engaged in hospital work, or have many patients visiting foreign countries. The publishers have printed it in their usual excellent manner, and, notwithstanding its copious contents, it is a most convenient volume to handle and to consult.

The Book of Prescriptions, with Notes on the Pharmacology and Therapeutics of the more important Drugs. By E. W. LUCAS, F.I.C., F.C.S. Pp. xvi + 375. Tenth Edition. London: J. and A. Churchill. 6s. 6d. net.

It is about 60 years ago (1854) that the first edition of this book appeared with the name of Henry Beasley, as author, on the title page. For about ten years it has been edited by Mr. Lucas, who succeeds in keeping it quite abreast of the times. The most striking change the editor has introduced is the giving of the metric equivalents, in all the prescriptions, according to the designations adopted in the new *British Pharmacopæia*. That is to say he makes use of the gramme and the mil (instead of the c.c.). We think he would have done well, however, to have made more use of the terms deci-, centi- and milli- rather than to express quantities in figures as decimal fractions of the gramme and mil. Errors of misplacing the decimal point and of omitting ciphers are so easily made. The book is an excellent compendium of modern *materia medica*, and is a good guide as to the value of many of the preparations which are so vigorously exploited by persistent advertising. We have tested the work thoroughly as to its comprehensiveness, and the only matter in which it has failed us is in our finding no notice of emetin as a remedy *per se*. It can be well recommended to the student as well as to the busy practitioner.

Prescribers' Formulary and Index of Pharmacy, adapted to the 1914 Pharmacopæia. By THOMAS PUGH BEDDOES, M.B., B.C. Camb., F.R.C.S. Eng. Second Edition. Pp. xvi + 132. London: Baillière, Tindall and Cox. 2s. 6d. net.

THIS little vest pocket-book is more of an index than a formulary. It is a synopsis of many hundreds of medicinal preparations classified in a manner which is no doubt useful to those who have used the book for a little while, but which, at first sight, appears to be confusing. The sections are Chemicals and Drugs for Internal Use, Galenicals, Regional Remedies, Genito-Urinary, Gynæcological, Rectal, External Treatment, Synthetic

Remedies, and Poisoning. There is a very large amount of information, and one rises from a perusal of the book with the feeling that the author's main purpose has been to see how much matter could be condensed into the smallest amount of space. For those who will take pains to master its intricacies it is well worth its price.

Synopsis of the British Pharmacopæia, 1914. By H. WIPPELL GADD, F.C.S., Barrister-at-Law. Pp. 196. London: Baillière, Tindall and Cox. 1s. net.

THIS is the eighth edition of *Gadd's Synopsis*, and is arranged on the same plan as previous editions. We notice that "Articles employed in Chemical Testing" has been suppressed, and a "Synopsis of the Poison Laws of Great Britain and Ireland" has been introduced. The metric doses are now given in the same terms as in the new pharmacopœia. This we think is the right thing to do, because the more quickly we all adopt the same nomenclature, the more readily shall we understand the new system and its working, and thus minimize the danger of making mistakes. This admirable little digest is an excellent addition to the busy practitioner's consulting table.

Standard Prescriptions for Insurance Practice. By C. H. GUNSON, M.B., Ch.B. Pp. 101. London: The Scientific Press, Ltd. 1s. net.

THIS is a little interleaved book which will go easily into the waistcoat pocket. It contains about 150 prescriptions useful in general practice. They are arranged in groups as mixtures, lotions, pills, powders, sprays, gargles, tablets, ointments, etc. Although there is nothing to indicate the diseases for which they are intended, the name attached to each prescription sufficiently well indicates its purpose. There are included several useful preparations for which the formulæ are often required, such as:—Solution for local anæsthesia, solutions for preparing and preserving ligatures, solution of soap, and lubricating oil. Posological, percentage, and weights and measures tables conclude this modest but serviceable compendium.

Students' Pocket Prescriber and Guide to Prescription Writing. By D. M. MACDONALD, M.D., etc. Fifth edition. Pp. 152. Edinburgh: E. and S. Livingstone. 1s. 6d. net.

THIS little book has been revised in accordance with the 1914 *British Pharmacopœia*. Two pages are occupied with a statement of the more important changes effected by the new pharmacopœia in internal remedies and external remedies. The body of the book consists, as in previous editions, of 488 typical prescriptions arranged under headings indicating the different classes of diseases they are intended for. We notice that in the metric equivalents of the weights and measures the author adheres to the cubic centimetre instead of the mil, and makes use of decimal fractions of the gramme rather than use the decigram, centigram and milligram. In this latter matter we think he is setting a bad example, because an error in the misplacing of a decimal point is so easily made and it is a mistake of great magnitude. There are

some concise tables of weights and measures, a short chapter on incompatibles, and a vocabulary of Latin words and phrases, as well as an index of diseases.

A Compendium of the Pharmacopœias and Formularies. By C. J. S. THOMPSON. Pp. vi + 398. Fifth Edition. London: John Bale, Sons and Danielsson, Ltd., 1915. 5s. net.

THE appearance of a new British Pharmacopœia has induced the author not only to incorporate in the new edition of his book the new official material, but to arrange the section in a different manner, and he has taken the opportunity of making it a compendium of pharmacopœias to a greater extent than it was before. In the previous editions the only foreign pharmacopœias noticed were the United States and the French. In this edition formulæ are given, in addition, from the Italian, Russian, Swiss, Danish, Spanish, Belgian, Netherlands, Norwegian, Japanese, Austrian and German pharmacopœias. A useful and judicious synopsis is given in each case, and the strengths of all the most commonly used preparations are given in such a way as to furnish a good and reliable guide when it is desired to compare preparations which are official in two or more countries. We notice that several sections have been eliminated; these treated of matters which are more properly sought for in chemical handbooks. They have been replaced by chapters which will certainly be more appropriate to a physician's compendium; they deal with: Salvarsan and its allies, diphtheria antitoxin, sterilization, maximum doses of potent remedies in foreign pharmacopœias, and French, German, Italian, Spanish and Dutch terms and phrases used in prescriptions. To give an idea of the amount of information that has been condensed into this compact little treatise, it may perhaps suffice to say that in the three pages allotted to the Pharmacopœia Austriaca nearly a hundred preparations are dealt with. This book is one of the most useful adjuncts to the consulting table that we know. It is well printed and smartly bound, but we wish the publishers would remember, when bringing out future editions, that a work of reference should be bound in such a way as not to provoke a wrestling match to prevent its closing spontaneously.

An Index of Symptoms with Diagnostic Methods. By RALPH WINNINGTON LEFTWICH, M.D. Fifth Edition. Pp. 516. London: Smith, Elder and Co. 10s. 6d. net.

FROM a very modest pocket book has been gradually evolved an important work, and one which will be found most useful to the clinical clerk at the commencement of his medical career, as well as to the lecturer, who is anxious to ensure that he has not omitted any vital point in his lecture. We have found it of great assistance in obscure cases of disease, for it suggests all the possible causes of any one particular symptom.

A short but interesting section is that devoted to the sexual proclivity of disease. Some curious facts have been elicited. Why, for example, should mitral stenosis be so much more common in females and hæmophilia be almost restricted to males? This subject opens up a wide field for speculation. Another illuminating section is that on "synonyms."

The nomenclature of disease is becoming daily more puzzling, especially when the name of the discoverer is applied to any particular symptoms or syndrome, so that this section will be found of great use. "Grave's disease," however, should be Graves's disease. The curious form of pyrexia due to rat-bite ought to have been included in the list of conditions causing a marked elevation of temperature. The *Index of Symptoms* is a book which every practitioner or student of medicine should possess. The edition before us is so exhaustive and so admirably arranged, that it is difficult to suggest any improvement.

Practical Hormone Therapy. A Manual of Organotherapy for General Practitioners. By HENRY R. HARROWER, M.D., with a foreword by PROFESSOR DR. ARTUR BIEDL. Demy octavo. Pp. xx + 488. Fig. 8. London: Baillière, Tindall and Cox. 15s.

THE commendations bestowed on this book by Professor Biedl are entirely well-deserved, for Dr. Harrower has brought together a mass of information on this modern development in treatment, which must now be taken seriously into account as a factor of much importance and many possibilities. As Professor Biedl points out, the problems presented can only be worked out properly by the collaboration of the general practitioners. In Dr. Harrower's book will be found the present state of knowledge, clinical and theoretical, lucidly and succinctly set out, and kept rigidly within the bounds of ascertainable facts, for most of the chapters have been submitted to the criticism of acknowledged authorities. This has served to curb the over-statement inseparable from enthusiasm, so that the reader—we hope there will be many—can feel assured that he is dealing with a well-balanced presentment of the whole subject. We congratulate Dr. Harrower on the judgement and skill with which he has marshalled the large amount of material he has gathered so industriously, and we heartily recommend his book as being well worth full consideration by every thoughtful practitioner.

A Text Book of Insanity and other Mental Diseases. By CHARLES ARTHUR MERCIER, M.D., F.R.C.P., F.R.C.S. Second Edition. Pp. 348. London: George Allen and Unwin, Ltd. Price, 7s. 6d. net.

THOSE who read Dr. Mercier's first edition of this interesting work will not be surprised that a second is required.

The author tells us the book has been entirely re-written, and there is certainly much interesting new matter, of which special mention may be made of suggested diagrammatic methods for making records of cases. Dr. Mercier ends his book with an interesting essay on the reasons which have led him to abstain from compiling an index, and predicts some of the effects which he considers will be produced on the minds of reviewers by its omission.

Dr. Mercier seems at times to feel somewhat aggrieved that his views on certain points have not all been so fully appreciated as they might have been, but in any case he may rest assured that whether his ideas are accepted or not, this book, like the rest of his writings, will be found full of interest to everyone who reads it, as indeed we cordially recommend everyone to do.

Preparations, Inventions, etc.

TYPHO-DIAGNOSTIC CAPSULES.

(London: Messrs. Allen and Hanburys, Ltd., 7, Vere Street, W.)

These capsules provide a new method for the rapid preparation of a suitable culture medium for the diagnosis of typhoid and para-typhoid fever. It was suggested by Dr. Dudgeon, and has been tested exhaustively in his laboratory. It is now being used in the bacteriological laboratories of the Army, which may be considered to be conclusive evidence of its convenience and reliability.

Each capsule contains sufficient sodium taurocholate in powder to make about 28 c.c. (one fluid ounce) of solution. One capsule is dropped into from 25 to 28 c.c. of distilled water in a wide test tube of 60 c.c. capacity. The medium is then sterilized by boiling, and, after the contents of the tube have cooled, about 10 c.c. of blood are drawn from a vein directly into the tube. The resulting mixture is an efficient culture medium, and is incubated and examined in the usual way.

The ease of preparation and the efficiency of the medium have been found of very great advantage in fully equipped laboratories as well as in those improvised for field service. The question of storage, always a difficulty with culture tubes, has in this instance been solved successfully.

The bile salt solution is supplied as well, ready for use in the "Hypsol" vacuum extractor. This consists of a sealed glass bulb, connected by pressure tubing to a suitable needle, the whole apparatus being sterile and ready for use. The bulb contains 25 c.c. of solution, and has been exhausted sufficiently to draw 10 c.c. of blood from a vein.

The capsules are supplied in boxes of 12.

THE "ALLENBURYS" CONCENTRATED FOOD PRODUCTS.

(London: Messrs. Allen and Hanburys, Ltd., Bethnal Green, E.)

Some recent additions have been made to these preparations, which present in a palatable and portable form the nutritive constituents of a complete food. They are ready for use, or need very little preparation, and are particularly well adapted for use by those on active service, afloat and ashore, as well as travellers and others exposed to irregular and inadequate meals. The name "Allenburys" is in itself a sufficient guarantee of reliability.

The "Allenburys" Diet Tablets.—These are composed of pure rich milk, whole wheat, and chocolate. They are very palatable, and are supplied in flat tin boxes, containing 36 tablets, which can easily be carried in the pocket. A stimulating and nourishing food-drink can be made by crushing a few tablets and adding them to a cupful of hot water. For allaying hunger and preventing fatigue three or four tablets may be allowed to dissolve in the mouth.

The "Allenburys" Nutrient Lozenges.—These products contain pure milk, whole wheat, and the soluble extractives of prime lean beef, thus combining stimulating with nutritious properties in a palatable form. Three or more may be eaten as often as required. They are put up in tin boxes, containing 24 lozenges, suitable for carrying in the pocket.

The "Allenburys" Meat Soup Squares.—These have been designed specially for quickly preparing a nourishing and sustaining soup. One

square is shredded into a breakfast cup, and enough boiling water is then added to the cup to cover the shreds. After standing for a few seconds to soften them, the cup is filled up with boiling water. The result is a soup of excellent flavour. The squares are supplied in flat tin boxes containing 12, suitable for carrying in the pocket.

ENERGEN BREAD.

(London: The Therapeutic Foods Co., 21/23, Bedford Chambers, Covent Garden, W.C.)

These preparations are not starch-free, and have been introduced to meet the requirements of the modern treatment of diabetes, in which carbo-hydrates, to the point of toleration, are recognized as a necessity in food. The bread is most palatable, having the flavour of ordinary bread, and is made in rolls of standard size. Each roll contains approximately 300 grains of carbo-hydrate, so that the amount tolerated by each patient can readily be secured in definite amount. It is a pure natural bread, made from fresh gluten obtained by washing the starch out of hard Canadian and American wheat flours. It contains from 30 to 35 per cent. of protein (dry), and a larger proportion of fat than ordinary bread. It has been awarded the certificate of the Incorporated Institute of Hygiene.

PROPHYLACTIC CHOLERA VACCINE.

(London: Messrs. Parke, Davis and Company, Beak Street, W.)

This vaccine is prepared in the Vaccine Laboratory of St. Mary's Hospital, which is under the direction of Sir Almroth Wright. The material has been obtained recently from the Continent. It is supplied in sets of two doses for the protective inoculation of one person, No. 2 being given 10 days after No. 1. It is put up as well in rubber-capped bottles containing 25 cc. This quantity is sufficient for the two protective doses of 16 persons, $\frac{1}{2}$ cc. being given for the first one, and 1 cc. for the second.

MIXED VACCINE FOR COLIFORM INFECTIONS.

(London: Messrs. Parke, Davis and Company, Beak Street, W.)

This is, too, a production from the Laboratory of St. Mary's Hospital. It is prepared from four different types of *B. coli*, each obtained from a genito-urinary or peritoneal infection. Two dilutions, C_1 and C_2 , are supplied, the second being five times the strength of the first. Each cc. of C_1 contains 20,000,000 *B. coli communis*, the same number of *B. coli communior*, 8,000,000 *B. lactis aerogenes*, and 4,000,000 *B. acidi lactici*. It has been issued for use in coliform infections, particularly in cases of urinary infection, when an autogenous vaccine cannot be obtained. Each strength is supplied in bulbs of 1 cc., and in bottles of 25 cc.

NUCLEO-PROTEID COMPOUND TABLETS.

(London: Messrs. Parke, Davis and Company, Beak Street, W.)

Each of these tablets contains 1 grain of potassium glycono-phosphate, 1 grain of calcium glycono-phosphate, $\frac{1}{2}$ grain of lecithin, and $\frac{1}{4}$ grain of nuclein. They have been found extremely useful in the debility following severe illness, as well as in the treatment of nervous exhaustion and other affections due to disordered nutrition. The effect produced appears to

be stimulation of the metabolic processes. The dose is one or more tablets three times a day, after meals. They are supplied in bottles of 100.

ANTERIOR LOBE PITUITARY GLAND TABLETS.

(London: Messrs. Parke, Davis and Company, Beak Street, W.)

This new preparation is made from the anterior lobe of the pituitary body. The physiological action of the two lobes is now known to differ considerably. The anterior lobe is believed to have a good effect in certain disturbances of metabolism, and has been found more or less useful in the treatment of delayed physical and mental development in children of neurotic type, Mongolian imbecility, suppressed menstruation, menorrhagia of indefinite origin, the obese type of sexually infantile pituitary dystrophy, and others. The average dose recommended is 5 grains, two or three times a day. The tablets, each of which represents $2\frac{1}{2}$ grains of the desiccated anterior lobe, are supplied in bottles of 25.

POSTERIOR LOBE PITUITARY GLAND TABLETS.

(London: Messrs. Parke, Davis and Company, Beak Street, W.)

The oral administration of the substance of the posterior lobe of the pituitary body is said to have been attended with good results in the treatment of acromegaly, osteomalacia, rickets, paralysis agitans, dropsy, urticaria and other skin diseases. The increase in blood-pressure, caused when pituitrin is given by hypodermic injection, is stated not to occur when the extract is given by the mouth. The tablets, each representing three grains of the infundibular portion (posterior lobe) of the pituitary body, are supplied in bottles of 25.

PARATHYROID GLAND TABLETS.

(London: Messrs. Parke, Davis and Company, Beak Street, W.)

Precise indications for the use of this gland are still wanting, but it has been claimed that good results have been obtained by giving it in paralysis agitans, eclampsia, chorea, epilepsy, tetany, and uræmia. The dose suggested is one tablet, once or twice a day, the treatment being continued for at least one or two months. These tablets contain one-tenth grain of desiccated parathyroids, representing three-fifths grain of fresh gland, obtained from cattle with special precautions against any contamination. They are supplied in bottles of 100.

THE "GLAXO" STOOL CHART.

(London: "Glaxo," 45-47, King's Road, St. Pancras, N.W.)

This ingenious chart, for use in cases of summer diarrhœa, has been drawn up on a scheme suggested by Dr. E. Harold Cooper. It combines on one sheet a weight chart, a temperature chart, and a chart for recording the number, size, colour, and consistency of the stools passed. The Company will be glad to send supplies free to those who write for same, mentioning THE PRACTITIONER.

VICHY.

The Syndicat d'Initiative de Vichy announce that the season this year will be carried on as usual. The springs and the bathing establishment will be open and available for patients. The concerts and performances have all been arranged to take place.

THE PRACTITIONER.

AUGUST, 1915.

THE EFFECTS OF CLEFT PALATE OPERATIONS ON THE DENTAL ARCH.

DISCUSSION AT THE SECTION OF ODONTOLOGY, ROYAL
SOCIETY OF MEDICINE.

OPENING PAPER.

By H. BLAKEWAY, M.S., F.R.C.S.

*Hunterian Professor, Royal College of Surgeons; Temporary Assistant Surgeon,
St. Bartholomew's Hospital, etc.*

IT is convenient to deal separately with the operations which aim at directly attacking the dental arch, and with those whose influence upon the arch is indirect.

Of the first class—*those which aim at directly attacking the dental arch*—the only operation that I am well acquainted with is Brophy's. The most suitable cases for this operation are those of complete clefts of both hard and soft palates, associated with hare-lip, the gap in the lip communicating with that in the palate through a more or less widely cleft alveolar process. In such cases, the dental arch is already deformed, not only by being cleft, but by the premaxillary bones being displaced forwards. The displacement in bad cases of double hare-lip and cleft palate is very obvious, the premaxillæ forming a very marked protrusion beneath the nose, connected by a narrow stalk with the anterior part of the nasal septum.

In cases of single hare-lip and cleft palate, both premaxillæ remain attached to the maxilla of one side, but are separated by the cleft from the opposite maxilla. In spite of this attachment, they are still pushed forwards by the overgrowth of the septum nasi, but being anchored on one side, are more or less tilted sideways, so that the nose is displaced away from the side of the hare-lip. Brophy prefers to operate on such children at an age

younger than three months. I have seen the results in twelve cases, and it seems to me particularly appropriate to discuss the effects of the operation upon the dental arch, because my experience has been that the effects are almost confined to the dental arch, any results upon the palate itself being usually negligible.

It will be remembered that Brophy claims that the operation closes the cleft in the hard palate. I have not seen such a result; the cleft in the palate has not even been much narrowed, in spite of all the squeezing of the jaws that was justifiable. The only part of the cleft to be closed has been that in the alveolar arch, and this was not due to inexpert operating (though the operation is a complicated one, requiring careful study), for two of the twelve cases were operated upon by Brophy himself. It cannot be doubted that the closure and completion of the alveolar arch is an important result, even though the palate still remains to be operated upon; but the question which has to be decided is, whether it is worth while or justifiable to submit an infant to an operation of the severity of Brophy's in order to bring about this result. I have decided for myself that it is not; I have never performed the operation upon a living child, and I have no present intention of doing so. The dental arch can be closed in much simpler ways, with much less danger to the child.

As regards the manner in which the shape of the arch is restored in Brophy's operation, if no more than moderate force is used in pressing the bones together, bending, and not fracture occurs, for the bones, though well ossified, are soft and yielding at this early age. I have seen fracture of one alveolar process occur, but it was due to the use of too much force in the attempt to approximate the palatal processes. Some published accounts speak of necrosis of the jaw following the operation. None of the cases which I have seen had it; probably, it is a theoretical objection to the operation. Theoretically, it is reasonable enough, for there is always a certain amount of sepsis under the lead plates, through which are passed the wires which hold the jaws together; infection of the bone must surely occur in the course of the six weeks during which the wires are in place.

The constant pressure of these plates upon the outer sides

of the alveolar processes might be supposed to interfere with the growth of the latter. I have not enough evidence upon this point, but some of my casts, showing the results of the operation, suggest an atrophy of the jaws.

The difficulty of passing wire sutures from side to side through the alveolar arch without causing injury to the contained teeth is an evident objection to Brophy's operation; frequently, the needle is felt to strike a tooth, and its path has to be altered to avoid it. In at least two cases I have seen teeth exposed at the time of operation, and sometimes teeth are shed during the few weeks following. The final effect upon the temporary teeth is not likely to be good; in three cases which I saw at the respective ages of 2 years 9 months, 17 months, and 2 years 5 months, the upper teeth were, for the most part, carious; but in one of the patients the lower teeth were equally bad. About the effect upon the permanent teeth I know nothing, and should be glad to hear the experience of others.

Much less important than the influence of Brophy's operation upon the anterior part of the dental arch is its effect upon the width of the arch. Brophy proceeds upon the assumption that in normal infants the upper and the lower dental arches are equal in width; that in cleft palate the upper jaw is wider than the lower by the width of the cleft; and that the condition of cleft palate is not, therefore, due to arrest of development, nor associated with any absence of palatal tissue. These assumptions are incorrect, as I have shown in a recent Hunterian lecture; consequently, the further conclusion, that the proper treatment of a case of cleft of the hard palate is to squeeze the two maxillæ into contact with one another, is ill-founded.

A series of measurements shows that in normal infants the width of the upper jaw, measured between the outer sides of the alveolar processes, is greater by a few millimetres than the corresponding width of the mandible. In bad cases of cleft palate, this difference in favour of the upper jaw is greater, but it is not, as a rule, enough to account for the width of the cleft. The explanation probably is, that when there has occurred an arrest of development leading to cleft palate, the cleft is made wider by the two maxillæ being more or less

pressed asunder. Forcible approximation of the maxillæ would result in an upper jaw narrower than the normal, and in many cases actually narrower than the mandible. But since Brophy's operation does not bring the maxillæ together, and does not even bring them greatly nearer to one another, discussion of its effect in narrowing the dental arch is unimportant.

Other operations directly attacking the dental arch are those which are undertaken for the reposition of projecting premaxillary bones. In the case of an infant with a wide complete cleft associated with hare-lip, no one could fail to be struck by the deformity of the premaxillæ, and with the wide gap at the anterior part of the dental arch; but in reading directions for the performance of Langenbeck's operation for cleft palate, one is equally struck by the paucity of references to methods of closure of the gap in the arch. The reason is a simple one; if one operates upon the hare-lip soon after birth, in the vast majority of cases the growth of the parts, together with the pressure of the closed lip, suffice to bring the displaced premaxillæ back into position, and so to close the defect in the arch without any further operation, in the course of a few months. Sometimes, actual union appears to have occurred; in other cases, close apposition without real continuity is obtained. But occasionally the defect in the arch is not closed in this way.

I would refer once more to Brophy's operation, to point out that this is my main reason for thinking it generally unjustifiable; the alveolar arch can be restored without this severe procedure, and its performance accomplishes little, if anything, more. I admit, however, that reposition and wiring of the premaxillæ may cause a more exact restoration of the arch than would otherwise result. But such reposition, if carried out as a routine practice, will sometimes be overdone, and will lead to that very ugly underhung appearance which is not seldom seen, besides causing a faulty direction of the incisor teeth. On the whole, I believe that it is best not to do much in the way of reposition of the premaxillæ, except in extreme cases of deformity, but to unite the lip over them, and leave Nature to do the rest.

It is scarcely necessary to mention removal of the pre-

maxillæ, a procedure which formerly held a well-recognized place in the treatment of hare-lip and cleft palate. I have seen patients upon whom it has been performed. They exhibited a gap at the front of the palate, a gap which sometimes Nature had attempted to close by the drawing in of the alveolar processes of the two maxillæ; in this way, the dental arch had become no longer an arch but a triangle, with its apex in front. Nowadays, I suppose, that operation is seldom performed; it is doubtful whether it is ever justifiable.

Another procedure, of the results of which I know nothing, consists in scooping out the incisor teeth from premaxillæ which are much displaced forwards. It is difficult to see how this can facilitate reposition of the bones, but probably some who are present have seen the results, and can say what the effects upon the dental arch may be.

Among the second class of operations—*those whose influence upon the dental arch is indirect*—the most important are—

(i) The turn-over flap operation (of Sir Arbuthnot Lane);
and

(ii) Langenbeck's operation.

In neither of these operations is there any attempt directly to influence the shape of the dental arch, or to obliterate the gap between the bones, as there is in Brophy's operation; both aim at bridging the cleft by flaps consisting of soft parts alone. In the great majority of cases in which these operations are performed, no effect upon the dental arch is to be observed, at any rate as regards its shape, but sometimes the effect may be considerable.

The turnover flap operation is more likely to have an effect upon the arch, both because of the early age at which it is performed (seven hours is the youngest I have heard of), and as a result of the method of its performance. In this operation, for the purpose of closing the cleft in the hard palate, the only part which concerns us here, a flap is made consisting of the whole thickness of the soft parts. This flap hinges at the edge of the cleft, across which it is turned; its raw surface is partly covered by the muco-periosteum at the opposite

side of the cleft, and is in part left uncovered ; the surface from which the flap is raised is left bare. The contraction of scar tissue, which results in this situation, may either draw in the alveolar arch on that side, or, I do not know which, prevent its normal expansion ; the result is the same in either case—the arch on the side from which the flap has been taken may be straighter than on the opposite side.

With or without straightening of the alveolar arch, some of the teeth may be displaced inwards by this contraction. Irregularity of the teeth is, of course, a frequent accompaniment of cleft palate, quite apart from operations ; but it generally affects the anterior teeth. This post-operative displacement is something different ; it often affects the pre-molar or molar teeth, and the displacement may be opposite a part of the palate which shows special evidences of scarring.

Apart from displacement, it is certain that the turn-over flap operation often causes injury to the temporary teeth ; because if the cleft is so wide that the flap would otherwise not be broad enough to bridge it, the latter is taken not only from the palate, but also from the alveolar process, or even from the mucous membrane of the cheek. No doubt, it is the raising of the flap from the alveolar process in such cases, which damages the teeth ; they are very commonly carious.

The plan of Langenbeck's operation is different : on each side of the cleft the muco-periosteum is raised from the bone in the whole breadth of the hard palate ; this is done (according to the taste of the operator) either by an elevator introduced at the edge of the cleft and working outwards, or by a similar instrument passed through a short incision at the outermost part of the hard palate, close to the alveolar process and working inwards. The flaps, when freed, have their edges pared, and are then sutured in the middle line ; owing to the height of the palatal vault, they are nearly always broad enough, in the case of the hard palate, to meet without any tension, even when no lateral incisions have been made. It must be noted that the flaps are often raised, not only from the palatal process, but also from the inner aspect of the alveolus. It is the degree of develop-

ment of the alveolar processes which determines the height of the palatal vault, and not the direction of the palatal processes; the latter are always horizontal, whether the arch is high or low.

After an operation of this kind, cicatrization, occurring in the space between the flap and the bone from which it has been raised, may occasionally lead to drawing inwards of a tooth or teeth. I think this is decidedly rare. I know nothing of flattening of the alveolar arch as a result of Langenbeck's operation, and I shall be glad to hear if it is within the experience of others.

DISCUSSION.

(a) SIR ARBUTHNOT LANE.

SIR ARBUTHNOT LANE said he was glad the section had done him the honour of asking him to be present, for he had enjoyed listening to Mr. Blakeway's interesting paper. In determining the course of treatment to be adopted in cleft palate one ought to decide in the first instance on the general principles that should govern it. Many years ago, he worked at the mechanics of the bones of the face and came to the conclusion that the factors determining their development were three in number. The most important, and the one that comes into action immediately the child is born, is the pressure exerted upon the sides of the nasal cavities by the air during the process of respiration. This affects the size of the nasal cavities and of the cavities that communicate with them, and so influences the height of the palate and the breadth of the alveolar arch, as well as the shape of the face. It is hardly necessary to call attention to the value of a well-developed naso-pharynx to the individual, both from the point of view of appearance and health, as well as of speech. The more perfect the development of the naso-pharynx, the finer is the face, the more healthy and robust the individual, and the more perfect the voice. The tongue is an associated factor which plays the chief part in the development of the lower jaw. It also affects the form of the palate and the alveolar arch of the upper jaw. The teeth become a factor at a later period in the life of the infant, both in occupying space and transmitting pressure.

The importance of the teeth as a factor in the evolution of the bones of the face is very familiar to the dental surgeon. When he came to consider the treatment of clefts of the hard palate, which at that time was never undertaken till the child had reached the age of three or four years, he realized that, owing to the communication which existed between the nasal cavities and the mouth, the pressure which is, in normal conditions, exerted on the sides of the nasal and associated cavities by the forcible transmission of air through these spaces was practically in abeyance during the first three or four or more years of life. The absence of this pressure resulted in a diminution in the size of the nasal cavities both vertically and laterally, in a progressive narrowing of the cleft and in rendering the segments of the cleft more vertical.

This imperfect development of the naso-pharynx in a case of cleft of the hard palate which had reached the age of four years was very advantageous to the surgeon, who then operated by approximating the edges of the elevated muco-periosteum, since it facilitated that procedure very materially at the cost of the development of the naso-pharynx and other structures which depend on it for their perfect evolution. That was evidently the reason of the delay in operating at that age.

At that time, an operation on a child a year old was deemed to be impossible. He found that by employing the flap method he was able to close the largest clefts in the youngest infant, some of which, especially the horse-shoe variety, could never be closed except by this method and then only before the temporary teeth had erupted. The earliest age at which he had operated was seven hours, but he had closed the cleft in the palate of a child removed by Cæsarian section at seven months. He made it a rule to operate in cases of complete cleft of the hard palate as early in life as possible, and upon the soft palate at a convenient subsequent date. In the case of cleft of the soft palate where the hard palate is complete, there is not the same importance of operating at a very early date since the mechanical factor exerted by air pressure is not in abeyance. A circumstance that favours early operation is that Sir Almroth Wright has shown that, while the resisting power of the tissues of the

infant is equal to that of the mother at birth, it gradually diminishes during the first month of life.

Another factor influencing early operation is the fact that children with complete clefts of the hard palate have, as one would expect, much less vitality than the normal infant, and their mortality is correspondingly greater. Those who reside in a children's hospital, and those who perform a very large number of operations on these cases of cleft palate are very familiar with this fact. This has been denied by those surgeons who prefer to postpone operation, and who, consequently, operate on the more robust specimens only, the more feeble and the more deformed having previously succumbed. Even after the cleft in the palate has been closed, the vitality of these children is somewhat lower than in the normal child, whose intelligence is usually of a distinctly higher order.

The vitality of the cleft palate infant, in the class which fills our children's wards, is also influenced by the greater difficulty which is experienced by the parents in feeding the child. In some cases, the abhorrence of the parent for the child's deformity and feebleness of physique often results in neglect of the child. These children not infrequently suffer from other faults of development. On all these grounds, the importance of early operation is indicated.

Since early operation was, like all other innovations in surgery, which is practically a creed and not a science, opposed for many years, he was able to operate on as many cases as he pleased, for he was flooded with material. Recently, other surgeons have commenced to operate fairly early in life, so that the supply has diminished and is now limited to the more severe types. It is probable that no surgeon will again ever perform so many operations of this sort, since the peculiar circumstances can never recur.

He was more and more assured of the advantages which operations performed in early infancy afford, and this opinion is now shared by a large number of surgeons.

In an ideal case, the cleft or clefts of the lip and hard palate would be closed at birth and that in the soft palate before the end of the first month. The changes that ensue in the first month after early operation are very great, and this

is much more marked in the first week, less marked in the second, less in the third, and still less in the fourth week of life. The advantage of early operation is now generally accepted by surgeons all over the world, and the old rule of delaying operation till the fourth year is limited to only the conservative few.

He divided the treatment of cleft palate under three heads, all of which were of equal importance.

First in order, surgical interference.

Secondly, the instruction of the child in voice production. One of the most striking results of this treatment is to show that the benefit which is obtained from skilled tuition bears no such very close relationship to the perfection of the surgical results as one would expect.

Originally, before he took up the question of the treatment of cleft palate by early operation, since the child had already learnt to speak by the time the cleft was closed, which was certainly three years and probably later, the surgeon did not expect that his operation would remedy the defective articulation, and apparently his procedure was undertaken solely to improve the appearance and comfort of the patient.

It is owing to the absence of the educational portion of the treatment that the children operated on in the children's hospitals suffer most. Being operated on early in life and being scattered at once all over the country, we have no means of teaching them to speak, nor have we been able to devise any except in a few cases.

He had asked Mr. Cortlandt MacMahon, who has devoted a great deal of time to many of his cases, to let him know how children, operated on at an early period by this method, speak if properly educated in speech production, and he writes as follows: "With one exception, in a child whose intelligence was distinctly below the normal, your cases have made good progress. Some speak almost perfectly."

The importance of speech education cannot be exaggerated, and he was very glad to have the opportunity of acknowledging his indebtedness to Mr. MacMahon for his great skill and patience in this form of treatment.

The third share, and by no means the least important in the treatment of these cases, is that undertaken by the dental

surgeon, whose treatment commences as soon as the teeth afford him a secure grip for his apparatus. Not only does he arrange the teeth in a symmetrical series and affect the outline of the alveolus, thus improving the appearance of the individual, but he also enables the patient to make many sounds which would otherwise be defective if the teeth were displaced. It has been asserted that the flap operation produces a scarring and cicatrization of the roof of the mouth with displacement of the teeth. He does not believe there is any evidence whatever for this statement. This mistaken belief has probably arisen from the fact that the reflected flap is almost always taken from the smaller segment of the palate and alveolus.

The position has changed materially since he first studied and formulated the general principles that should guide us in the treatment of cleft palate. That these principles have been generally accepted is evidenced by the fact, that surgeons now operate as early in life as the particular method they favour enables them to do.

At the present moment, the discussion is limited to the consideration and determination of the best form of operation, and surgeons are much divided on this point.

Time and experience alone will settle this question.

To a large extent, the procedure favoured must depend on the nature and degree of the deformity, and on the experience, skill, and ingenuity of the operator.

(b) WARWICK JAMES, F.R.C.S., L.D.S.R.C.S.

Lecturer on Operative Dental Surgery, Royal Dental Hospital, etc.

MR. WARWICK JAMES said he had been working on cleft palate cases for over ten years, but he had difficulty in being able to produce results during that time, for the patients were usually seen at an early age, and the treatment could not be regarded as complete until the patient had reached adult life. He had had two patients whom he could describe now as adults, and he exhibited models and photographs of them and some others, his object being to show the deformities which occurred in the dental arch. These deformities occurred on all three planes; displacement occurring inwards, backwards, and in a vertical direction. In cases in which cleft palate had

been operated upon, there was always some degree of deformity of the dental arch, and practically always in the three planes. He had not always known in his cases by what method the operation had been performed, but he had seen cases at the Royal Dental Hospital, Great Ormond Street Hospital, and privately, which had been dealt with by various operators. The illustration of a case over 20 years of age showed the condition prior to and after treatment, demonstrating the very considerable change which could be effected. This case showed the movement which had been effected of the bony structures as well as the teeth. In correcting the dental arches, several objects would have to be achieved. The arch itself would need to be corrected, so that it approximated as far as possible to what would be a normal condition. If this was achieved, the appearance of the patient would be greatly improved, the teeth would be rendered more serviceable, and the possibilities of improvement in speech greatly enhanced. Other benefits would accrue, such as greater mobility of the lip, and in fact many of the great discomforts from which such patients suffer would be removed. After the correction of the teeth in their alignment, it would probably be necessary to build up the teeth in order to correct the malocclusion.

He had dealt with cases both in hospital and private practice at the age of two years and upwards. The great difficulty in dealing with hospital patients rendered their satisfactory treatment almost impossible. The two cases shown, in which treatment had been completed, were seen privately.

He could not discuss the question from the surgical point of view, for he had not operated upon cleft palate.

With regard to the deformities which occurred in the dental arch, he was of opinion that they were dependent upon two factors. One was the growth of the jaws being impaired; the other was where the normal forces which mould the arches, namely, the tongue, lips, and cheek were abnormal in their action, particularly in those cases in which the habit of mouth-breathing had been established. He thought that the latter factor largely accounted for the inward displacement. It was necessary for the dental surgeon to remember that the nasal cavities were frequently undeveloped, and in carrying out correction of the arches this condition should be improved

as far as possible, and restoration of nasal breathing brought about.

The ordinary processes in the production of irregularity in the teeth might co-exist, but he did not consider them of great importance, as they could be corrected in the ordinary manner by the methods usually adopted. Sir Arbuthnot Lane had spoken of the condition being dealt with after the eruption of the permanent teeth. An attempt to treat the cases could be made at an earlier stage than that, but on account of the flatness of the arch it was often difficult, and in consequence it was not easy to use an appliance. Moreover, the introduction of a fixed appliance took time, and these children were found to be peculiarly shy, owing to the previous operation. After eruption of the permanent teeth treatment was easier, for the parts had developed. In conclusion, he stated that the possibilities of a good result being obtained might be regarded as most promising.

(c) THOMAS H. KELLOCK, M.D., F.R.C.S.

Surgeon to Middlesex Hospital, etc.

MR. THOMAS H. KELLOCK said that if he accepted the President's invitation to make some remarks, they must be from the point of view of the operating, rather than that of the dental, surgeon. He would not apologize for disagreeing with the views of Sir Arbuthnot Lane. He took a different view as to the age for operation and the method of operation on children with cleft palate. It had been said that a large proportion of these children died if left alone; that they neither breathed nor fed properly, and, in the end, succumbed from inanition.

Some years ago, he found that at Great Ormond Street Hospital nearly all the cases of cleft palate were being operated upon as babies, and some of his colleagues and himself, who preferred to leave the operation until the child was a little older, had few of these cases coming under their care. He protested that the palates of these babies were, from his point of view, being spoiled at an early age. He, therefore, as it were, bespoke some of them, which were kept for him until they were older. When he got them they were a year or 18 months old, and he was surprised to find what remarkably fine, healthy

children the majority of them had become. It was true that in the interval a certain proportion of them may have died from inanition. It was easy to prove that if these cases were operated upon, a certain proportion of them died; but it was difficult to demonstrate that if operation were not done, they would likewise die. His contention was, that if one were going to get an ideal result in a child's mouth, that result could best be secured by a median-line suture of the palate.

Mr. Blakeway had shown that when a flap of muco-periosteum had been taken almost entirely from one side of hard palate, it would bring about an inequality in the size of the two sides of the upper jaw. If the contraction following the operation for cleft palate were going to displace the teeth even slightly, it was far better that such displacement should be symmetrical, rather than that one side should be drawn in, and the other left in its former position. Therefore, if he were asked when he preferred to do an operation for cleft palate, he would reply, at the earliest age at which he could reasonably hope to derive success from a mid-line suture. He did not think the operation was much more difficult then, and if there were a good result with healing of the palate in the middle line, that result was the best that could be obtained.

What was the result of the flap operation in the case of the little baby? When the child was 8 or 10 years of age, it would be found that the palate was drawn over to one side, and the soft palate was likewise displaced, scarred, and tightened. Articulation was very deficient as well, and one found the soft palate stretched across the back of the mouth almost like the string of a bow, and leaving a large gap between it and the back of the pharynx; it did not move properly, and the speech was very bad. If the child was to have good speech, it was essential to ensure a movable soft palate.

The ideal time and operation depended somewhat on the width of the cleft and the height of the palate.

With regard to the subsequent displacement of the permanent teeth, he thought this was less and less asymmetrical in the middle line operations than when a flap was turned across.

REPLY.

MR. BLAKEWAY, in reply said that he supposed all would agree with Sir Arbuthnot Lane that these children ought to be operated upon as soon as possible after birth, if by such an operation the best possible result was thereby attainable. But he felt sure that the children, who were operated upon at the early age mentioned by Sir Arbuthnot Lane, did not obtain the best results. He supposed that the most important good which one hoped to do these children by operation was to improve their speech; that was of great importance in their after-life. Owing to the kindness of Sir Arbuthnot Lane, he had been able to trace a number of cases which had been operated upon by flap method, and to publish the results. Of 100 consecutive cases, he had succeeded in tracing 87 at periods up to nine years after operation. The result was very striking. Among the cases of complete clefts, in both hard and soft palates, only one of the cases he saw—and he was only speaking of cases he saw—had a good result as regards speech, and that child had not been operated upon at the very early age which had been advocated; he was 14 months old when the operation was done, not far short of the age at which Langenbeck's operation was usually performed. The vast majority of children who spoke badly in after years had been operated upon at an earlier age than six months.

He considered the time had come when one ought not to argue, from theoretical considerations as to the growth of the palate, as to what sort of operation should be performed. Surely this was the kind of case which was amenable to the statistical method; and if the late results of one form of operation done at a certain age were found to be the best, the operation at that age, and that form of operation should be persisted in, whatever theoretical considerations were entertained.

He had been much interested in the casts exhibited by Mr. Warwick James, because they were not the sort of cases which usually came his, the speaker's, way. He assumed that most of them had been operated upon by the flap method. He thought it was unusual to see cases which had been operated upon by Langenbeck's operation presenting such a deformity of the dental arch; it was so in his experience.

TRAUMATIC SUBDURAL HÆMORRHAGE.*

By L. BATHE RAWLING, M.B., F.R.C.S.

Assistant Surgeon, St. Bartholomew's Hospital, etc.

THE particular class of case which I wish to discuss is said to be very rare, but in reality I do not think it is, because I have had experience of some few cases. The first case which came under my care, was in 1907 or 1908, and there are points about it, to which I would like to draw attention.

CASE I.—The patient was an elderly man, who fell down in the street, striking his head on the right side. He lost his senses for a few minutes, and when brought to the hospital he was still dazed and complained of headache. He was sent home in a cab, and assisted to bed by his wife. Obviously, the house-surgeon on duty did not consider the case to be very serious. The patient kept to his bed during the next week, complaining of constant headache, and he was exceedingly irritable. Towards the end of the third week, his wife noticed that he seldom used the left upper and lower extremities, and this paresis increased steadily. The face was drawn at the right side. He was again brought to the hospital, and was admitted under my care.

Three weeks after the accident, when I saw him for the first time, he was only partially conscious and his mental condition varied during the day. He muttered to himself in a low tone. The left upper extremity was paralysed, the face was drawn to the right side, and the left lower extremity was but little used. The temperature in the left axilla was two degrees lower than that on the opposite side.

The points to notice in this case are as follows. First of all, the injury was comparatively slight, so slight that he was not totally unconscious, but only dazed and irritable; then, after a certain period of time, about three weeks, he began to show definite signs of hemiplegia—he began to be paralysed down one side of the body; his general condition became worse, and he was readmitted to the hospital. I diagnosed that he was suffering from subdural hæmorrhage, and operated. I found a large subdural clot, and the patient got perfectly well after the operation.

CASE II.—Some little time after this I was called down to Wimbledon to see a patient, about 18 years old, who gave the following history. On

* Clinical lecture delivered at St. Bartholomew's Hospital.

the previous Saturday he had been playing Rugby football. His brother, who was in the same team, told me that, as far as he knew, there had been no question of a serious accident of any sort. The boy did not complain of any injury or headache or of anything interfering with him in general. In the evening he complained of headache, but ate his dinner and went to bed early. On the Sunday, he got up at the usual time, and went out to lunch. The brothers were accustomed to lunch every Sunday with some friends a few miles away, and went there by rail. After lunch, as he was not feeling very fit and complained of headache, the patient said that he would go home. His brother went with him, and in the train the boy became unconscious. On the Monday, he was seen by a surgeon, and late on the Tuesday evening, I was called in. I found him completely unconscious, with obvious spasticity on one side of the body. I diagnosed a subdural hæmorrhage, and operated on him at once. I found a very large subdural clot.

In this case, there was very much the same history as in the first: no very serious injury of any kind, and no period of unconsciousness. The boy was not well, and, as his brother said, rather irritable, but beyond that there was nothing to help us in our early diagnosis. Later on, he became paralysed on the one side, and finally, 24 hours after the accident, completely unconscious. The history was a little more rapid than that of the first case.

CASE III.—An elderly man was brought into the hospital on May 23rd, after having fallen off an omnibus. The height from which he fell was nothing very great, and the injury itself was comparatively slight. Mr. Garrod tells me that he was semi-conscious and exceedingly irritable; he refused to answer questions, and objected to all methods of examination. When put on the couch to be watched, he was found wandering round the surgery later on, enquiring into things, and refused to go back to the couch. There was never any period of definite unconsciousness, but there was general irritability. When I saw him the next day, a new feature had developed in his case; he could not speak. The injury was on the right occipital region. He was exceedingly irritable, and resented being asked any questions. He was throwing himself about in bed.

I diagnosed subdural hæmorrhage, and at the same time I investigated a point, which is always of interest, namely, the temperature on the two sides of the body. I want to lay considerable stress on that point. This man's temperature on the left side was 102° , and on the right 99° . This case showed exactly the same difference that I have seen in every case of subdural hæmorrhage I have had to treat, which number six or seven now, namely, a very marked alteration of temperature on the two sides of the body, the temperature on the

injured side of the brain being higher than that on the opposite side.

We will now consider how these cases of subdural hæmorrhage are diagnosed, and then discuss a few points on the question of treatment. This particular type of surgical trouble was first described fully by Bowen, a Guy's man, many years ago, and recently in the *British Journal of Surgery* there have been some articles dealing with the question, but all from a late point of view. I want to go a little further, and get to what may be called the acute stage, because if the patient is to be cured then is the time to operate. It is no use waiting until the man has a huge blood cyst, with the various changes that occur in blood cysts in general; he must be treated at the earliest possible moment, as Cases 2 and 3 were treated. Then the patient is given every chance of complete and absolute cure, instead of mere palliation.

First of all, we will consider some of the points in diagnosis. The injury is a slight one, and the patient, as a rule, shows no marked degree of unconsciousness; in some cases, he is quite conscious throughout. For a short period after the injury, he is exceedingly irritable. Irritability in itself is one of the symptoms of head injury, and almost invariably indicates surface contusion or laceration of the brain. Any man who receives a head injury, whether of severe or slight nature, and who is exceeding irritable and restless, is almost absolutely certain to have some degree of surface contusion or surface laceration of the brain. Therefore, we had something to go on in Case III.—slight injury, great mental irritability; therefore, surface lesion of the brain.

Going a little further into the history of this case, we find that in the course of about 24 hours the patient became speechless. For that there is only one explanation, which is that he had marked compression over the second left frontal convolution; in other words, that he had definite compression over Broca's motor speech area. I will explain later how that occurs.

Another point of some importance is, that he had very slight twitchings of the face and arm on the right side of the body. That again is evidence of subdural hæmorrhage. The injury to the parieto-occipital region was not very

serious. The patient gets very restless and irritable, and later on develops aphasia and has twitchings of the right arm and leg. These symptoms in themselves are absolutely sufficient to allow us to diagnose, without any question whatsoever, that the patient is suffering from subdural hæmorrhage.

The other point in the history of the case was the temperature changes. They are of very great importance, and help to clinch the diagnosis, because they prove at once that the patient is suffering, not from general hæmorrhage of the brain, but from hæmorrhage limited to one side.

Another type of intracranial hæmorrhage is extra-dural bleeding from the middle meningeal artery. In such cases, the injury may not have been severe, but the history is absolutely different. A man suffering from an extra-dural hæmorrhage generally gives a history of having received an injury, and being knocked out absolutely; he is quite unconscious, and remains so for a variable period of time, from five minutes up to five hours or even five days. But this is the point, in a typical uncomplicated case the patient completely recovers from the unconsciousness, and is practically well for a variable period of time, not complaining of any serious disability. He is sometimes able to walk a considerable distance, to remount a bicycle or get into a car, or anything of that sort, and to go on with his ordinary duties—sometimes for a few minutes, sometimes hours, sometimes days. After a period of unconsciousness, there is a complete return to a practically normal condition. That is quite different from the patient I am discussing.

Our first patient went to bed, and remained there for three weeks; he would not speak, would not take his food, threw himself about, and made himself as objectionable as possible. In middle meningeal hæmorrhage, after the patient has passed through a period of recovery, he begins to show symptoms of cerebral compression; he gradually becomes heavier and heavier, sleepier and sleepier until he finally becomes unconscious, and, unless the clot is evacuated, he dies. In subdural hæmorrhage, we find first of all that the blow is slight, that there is no real period of recovery, and that the symptoms of hemiplegia may take altogether even

three weeks to develop. Some cases have been recorded in which five weeks have elapsed between the time of the accident and the hemiplegia.

In these subdural hæmorrhages, the blood is not derived from an artery at all but from torn veins ; the clot is of venous origin, and therefore of very low pressure. That is an important point to bear in mind. The pressure exercised by the clot is of very slight compressive power. The question at once arises : Is this blood clot derived from any special vein ? There are two theories. One is that the hæmorrhage is derived from the superior longitudinal sinus, and the other that it is derived from the cortical veins. My own opinion is, that it is derived in the great majority of cases from the cortical veins, and from those veins only. If there is hæmorrhage from the longitudinal sinus, the patient generally passes into a state of unconsciousness almost at once, and there is hardly ever any recovery.

When a cortical vein is torn, the blood will extravasate throughout the subdural space, occupying the whole of the supratentorial space on the one side. There is nothing to limit the extension of blood over the whole surface of the brain. In addition, some blood will gravitate through the opening through which the mid-brain passes, and a certain amount will surround the medullary region ; medullary symptoms are noticeable in quite an early stage. In all cases of subdural hæmorrhage, it will be found that the medullary symptoms are quite definite. There will be a very marked rise of blood-pressure. The blood-pressure in Case III. was 165 to 170 millimetres, the normal at his age being 140. The pulse rate is important too ; this patient had a pulse of about 60. Therefore, in addition to taking the temperature, we must estimate the pulse-rate, and above all things the blood-pressure.

Next, we have to try and explain the aphasia. The speech centre, so far as the cortical centres are concerned, is situated very low down over the cortical strip, and we have to try and explain why it was that the speech centre in this particular man seems to have been picked out more than any other of the cortical centres. He is said to have had twitchings of the arm and face, but he had no twitching

in the leg. Therefore, the pressure exerted by the clot was exerted mainly over the speech centre.

The speech centre involved in this case was the motor speech area. I do not think we tested him fully, because he was not in a condition to be tested. At any rate, the area involved was mainly the motor speech area, situated in the angle between the two main limbs of the Sylvian fissure.

This man had a slight injury, mental irritability, and therefore surface contusion of the brain. Later on, he developed aphasia, associated with very definite symptoms of medullary compression. He had a slow, full pulse and high-blood pressure, and showed very marked inequality of temperature on the two sides of the body. This is, in reality, a perfectly clear case of subdural hæmorrhage.

That being the case, the question of treatment arises. I do not say that this man would have died—I think he would have, but I cannot say for certain—if he had been left alone. If we leave a case of this sort alone, and the patient lives, we leave him with a blood-clot right over the left half of his cerebral hemisphere, with definite compression over his speech centre; the result will inevitably be that the paralysis from which he suffers will become permanent. In addition to that, he is almost certain to get spasticity of one side of the body, and in all probability he will end his days in a lunatic asylum. If we operate, the sooner that is done the better. One very important reason for operation is to relieve the brain pressure as rapidly as possible, and we find that, in the great majority of cases, the patient will be cured completely. This man shows on the left side of his head the site of the scar, and he has a small gap in his skull situated over the region of his speech centre.

In a case of this sort, we have to remember, first of all that the patient is not in a very good condition, and it is therefore necessary to save him losing as much blood as possible during the operation. In this case, we applied a tourniquet round the head, and reduced the scalp hæmorrhage to an absolute minimum. When the scalp-flap has been turned down, then comes the question of where to trephine. I do not think it matters in the least, so long as it is done over the lower motor centres. If the diagnosis

is correct, one is bound to find the clot. As a rule, one trephines over the lower motor centres or a little lower down, the idea being to drain somewhere near the more dependent part of the clot.

The diagnosis is verified by the general appearance of the dura mater. If the diagnosis is wrong, no harm has been done to the patient; a gap has been made in his skull with an ordinary $\frac{1}{2}$ -inch trephine, and that does not matter. If the diagnosis is correct, it is shown as soon as the disc is removed; the dura mater is sufficiently translucent to allow the veins beneath to be seen. On the other hand, if there is a blood clot beneath the dura mater on the brain, the whole dura mater will be plum-coloured. In this man's case, we saw at once that the diagnosis was correct, whereupon I enlarged the hole in the skull, opened the dura mater, and out came fluid blood. If a subdural hæmorrhage is allowed to remain, the blood clots, and sticks to the dura and to the brain; in that case only about half, even if as much as that, will be removed, and the patient will be left with a blood-clot, whereas by acting quickly the blood is quite fluid and can be washed out. The fluid blood came out in this case in a little stream, 1 inch high, and was washed away. The best way to wash out the space is to use an ordinary irrigator with a soft rubber catheter, not a glass nozzle, at the end of the tube. In this case, we pushed the catheter right to the front of the skull, then to the back, up to the longitudinal sinus and down to the base of the skull, thus washing out the whole of the subdural space.

As soon as the fluid comes away clean, sufficient has been done. The brain remains compressed. How long it remains compressed is not known, most likely for some hours after the operation, and possibly even for some days. It is compressed by reason of the fact that the blood extravasated on its surface has squeezed the brain just as one squeezes a sponge, but it does not fill up in the same way as a sponge, it takes longer. It will, however, fill up all right, if given a chance, and that is afforded by removing the compressive force, evacuating the space thoroughly, and draining it. Some surgeons are not in favour of draining, but I think it is advisable to do so for from 24 to 48 hours. This man was drained for 48 hours,

and from the time of his injury he has made an uninterrupted recovery. The only symptom he has now of any lesion is absence of knee-jerk on the right side, but it is returning; the left knee-jerk is present. In every other respect, he is well; he eats well, sleeps well, and is perfectly sweet tempered again. For several days he was irritable, made caustic remarks about the treatment carried out, and objected to the surgeons and the nurses. Now, he is a perfectly ordinary individual, who has made a complete recovery, and is going home.

The point I wish to insist upon is that these subdural hæmorrhages are not uncommon, and are most dangerous and insidious unless studied carefully, because the symptoms are so exceedingly indefinite. One might say, even, that the more indefinite the symptoms, the more likely it is that a subdural hæmorrhage is present. In the early stage of compression, the hæmorrhage derived from cortical vessels is very insidious in its onset, and is likely to be overlooked and left untreated; in which case, the patient will suffer from the many after-effects of head injury in the years to come. I have no doubt that a good many patients in lunatic asylums have had extensive subdural hæmorrhage.

For correct diagnosis, we must first of all bear in mind the history, and next investigate the alterations in medullary stimulation, from the point of view of the slowing of the pulse and raising of the blood-pressure. Then I always advise taking the temperature in the two axillæ, for I think it will be found that every single case of subdural hæmorrhage, if it is limited to one side of the brain, will show a very marked alteration in the two sides of the body, the temperature on the injured side being higher than that on the other side of the body. In the presence of a raised blood-pressure, a slow pulse-rate, alteration in the temperature on the two sides of the body, mental irritability, and localized symptoms such as are present in most cases, the diagnosis is absolutely clear and complete from the beginning.

The final point to which I wish to draw attention is the late onset of some of these localizing symptoms. It was three weeks before this man had definite symptoms. He certainly had symptoms before that, because his wife noticed that in a

week he could not move his arm properly ; but from one to three weeks elapsed before these symptoms became at all defined symptoms. It is a little difficult to say why the localized symptoms take so long in developing. The hæmorrhage forms at once, why not the symptoms ? We do not know enough about these cases to say. One suggestion is that there is a fresh hæmorrhage taking place from the old one, but I do not think that is the case. The other, and more probable, is that the blood-clot on the brain, being at a very low level, does not exercise any effect at the time, because, so to speak, the brain resists the pressure ; but after resisting it for a week or more, it relaxes, and the blood-clot begins to exercise more definite effects, so that the surfaces of the cortical vessels are more compressed. Another point is that these localized symptoms, too, are indefinite ; first of all there is a slight paresis, which later on develops into definite paralysis.

Finally, it must be remembered that, unless the clot is evacuated, the patient will either die or suffer from the many serious after-effects of cortical compression, headache, optic neuritis and atrophy, hemiplegia, etc. On the other hand, early operative treatment usually brings about a permanent cure.



THE USE AND ABUSE OF PURGATIVES.

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THE indiscriminate use of purgatives is abuse, for there is, perhaps, no single condition that requires more careful consideration before deciding on the right treatment to adopt than that of constipation. If constipation is acute, that is to say of sudden onset, then it is a safe rule to avoid the employment of purgatives entirely, until the case has been thoroughly examined and watched for a sufficient time to enable the observer to eliminate all conditions in which purgatives might do harm. If the constipation is due to any of the states for which the use of purgatives is likely to be beneficial, then no harm will accrue from waiting, whilst the unwise administration of a cathartic may be followed by disastrous results. For example, if constipation is associated with vomiting and visible peristalsis, there is in all probability complete obstruction due to some cause which will be intensified by attempted purgation; appendicitis, especially in children, is characterized not only by temperature, epigastric or right iliac pain, and vomiting, but by either diarrhoea or acute constipation as well; perforation of stomach or bowel may, in addition to the general abdominal distension and tenderness and localized pain, show a suddenly developed constipation. Generally speaking, it is wrong to give purgatives in any case of a suddenly developing "acute abdomen."

Everyone agrees that the frequent exhibition of drastic purgatives is an abuse of these valuable remedial agents. But it is by no means certain that the daily use of an irritant of low intensity but of constant application, such as the highly popular liquid paraffin, may not carry in its train dangers which are very real, though they do not become immediately manifest.

Purgatives and purgative measures may be said to have three main objects: one, to unload an overfull bowel; two, to

prevent auto-intoxication from substances which either ought not to have been formed in the processes of digestion or which have been delayed in their passage along the bowel, and so unduly taken up; and three, to produce a condition which will tend to the flow of fluid from the intestinal vessels into the bowel, and which will correspondingly interfere with the absorption of fluid from the bowel, the result being that there will be depletion of vessels and tissues of fluid.

With regard to the first of these conditions, namely, an overfull bowel, this may arise either from undue delay occurring in the passage of material through the intestines, so that fæces are formed more rapidly than they are evacuated, the result being a gradual accumulation in the transverse and descending colon, or it may be due to the fact that whilst the fæces arrive in the pelvic colon in the normal 16 hours after taking the food, of which they are the residue, they are retained there for an unduly long period. This latter condition may occur at any period of life, but is especially apt to occur in those who are irregular in the time at which they go to stool, in persons who drink too little fluid, and in whom the fæces are inclined in consequence to be especially dry, in patients suffering from organic nerve disease in whom there is some interference with the normal reflex for defæcation, and in those with very lax abdominal walls, as in the case of women who have borne many children or in people who, having been stout, have become thin. This condition of pelvic constipation is best treated by purgative measures, such as the use of enemata, together with abdominal exercise and massage, the employment of suppositories, or, where required, the provision of artificial abdominal support by a bandage or belt. Cathartics should either be avoided altogether in these cases, or at most only used as a temporary measure.

Delay in the passage of material along the bowel, apart from those cases in which there is a stricture at some part, is due to insufficient action of the muscle, either caused by deficient power in the muscle itself or to inadequacy in its stimulation. Deficient power in the muscle may be the result of long-continued intestinal dyspepsia, especially when the food has been largely of a starchy nature. In these cases, there is almost invariably much flatulence with a correspond-

ing tympanitic distension of the abdomen. The constant overstretching of the intestine produces eventually an atonic condition of the muscle, which gradually becomes deficient in contractile power. A vicious circle is thus produced, in which the over-distension causes weakening of the propulsive power, and this in turn results in an increase of the over-distension. Following on the delay in the passage of the intestinal contents, there is increased production and absorption of toxic bodies and a consequent interference with the general health.

This class of case is, on the one hand, most difficult to treat, and, on the other, is most in need of assistance, for to it belongs the large army of chronic dyspeptics who are not ill enough to consent to rigid methods of cure and yet are never well. They fly from one quack medicine to another, fill the coffers of the pill-vendors, are for ever trying new methods of diet, and, whilst abusing the medical profession as a whole, are yet always seeking for some doctor who will cure them without demanding that they should use common sense in carrying out the treatment advised. If any permanent good is to be done to these patients, they must be taken seriously in hand, informed that cure will take time, and urged to take only the medicines and to follow only the measures that the doctor prescribes. The mere giving a prescription for a purgative, whilst leaving the patient to decide when and how to make use of it, is worse than useless, for though the taking of a strong purgative may temporarily relieve, it will in the end only accentuate the malady.

In the milder cases, the association of a nightly vegetable purgative with a careful diet and the free use of water by the mouth may be sufficient to cure, the purgative being dispensed with as soon as the normal state has been restored.

In the more chronic or severe types, the patient should be put to bed upon a restricted diet, chiefly nitrogenous in character, and made to take freely before meals, water, to which a small quantity of a saline aperient has been added. General massage should be applied, and if necessary the bowel should occasionally be washed out. After a week in bed, he should be allowed to get up, the diet being then increased in quantity and varied in character; the aperient should be dispensed with, and he should be encouraged to take walking

and riding exercise. The massage should be continued for a time and an occasional enema given if required.

Cure having once been attained, it will not be necessary in most cases to return to the use of purgatives, except occasionally when some error in diet, etc. has made their temporary use advisable. If, however, the bowel, though having recovered its tone, is found still to require some greater stimulation than that afforded by ordinary food, or if it is impossible for the patient to continue to take sufficient exercise, and especially if he has passed middle age, then no harm will result from the daily use of a dinner pill of aloes and belladonna with a little dried sulphate of iron, or a nightly draught of an infusion of senna pods.

In cases in which the deficient muscular power is due to some general condition, such as chlorosis, lead poisoning, etc., then naturally the cause must be dealt with, and the symptom relegated to its proper place in the general scheme of treatment.

When constipation is the result of an inadequate stimulation of the bowel and a consequent deficiency in the force of the peristaltic movements, due either to the food being rapidly digested, or to its not containing much residual matter, the treatment will manifestly be to make an alteration in the kind or quantity of the food. It is sometimes well in these cases to commence the treatment by the administration of mild vegetable purgatives on the one hand, and on the other to increase the bulk of the waste matter by giving an abundance of fruit and vegetables. The purgative drugs should be discontinued as soon as possible; indeed, in most cases it will be found that they become too powerful in their action after a few days, with the result that the patient will give up taking them of his own accord.

The third use of purgatives, namely, for purposes of depletion, is one of the utmost importance. Whilst the conditions already dealt with are most likely to be present in the first half of life, and are, in the majority of cases, best treated by vegetable purgatives, the need for depletory measures chiefly occurs in the second half of existence and calls for the application of saline aperients. It may thus be said with truth, that vegetable purgatives find their chief application in the

constipation of the young, and salines in the conditions that are most likely to be met with after 50. Saline cathartics interfere with the absorption of fluid from the bowel on the one hand, and on the other cause an increase of intestinal secretion; it is essential, however, for their activity that there should either be abundance of fluid in the vessels or else that plenty of water should be administered at the same time as the drug.

If it is desired to obtain the full depletory effect, they should not be given in too dilute solution. The free flushing of the bowel and the consequent washing away of bacteria and their products, the interference with the absorption of food, especially of fats owing to the formation of insoluble soaps, and the abstraction of fluid from the tissues, all tend to lower the blood-pressure when it is unduly high, and to cause a diminution in weight. In this latter respect, if at the same time the diet is restricted and regular exercise enforced, the loss of weight may in a comparatively short time be considerable, the general health being greatly improved and the work of the heart being sensibly reduced. Though this treatment can be quite efficaciously carried out at home, it is obviously much easier at a health resort, where there are the added advantages of change of scene and removal of home and business worries. At health resorts, the salines employed will obviously be the natural mineral waters of the district, but if the cure is followed at home, sulphate of soda is perhaps the best saline aperient to employ, in the majority of cases.

JOINT TROUBLES ARISING FROM NERVE DISEASES.

By JOHN STEPHEN McARDLE, M.Ch., R.U.I., F.R.C.S.I., ETC.

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THE study of joint disease has not kept pace with the general advance of surgery. While intestinal, cardiac, and cerebral surgery have engaged the attention of fame-seekers, the humdrum work of the surgery of joints has been left almost at a standstill, and so it comes to pass that some of the affections, to which I will here refer, have had very little consideration at the hands of the Profession. Before long, however, there will be a revival of interest in this subject, because joint diseases, that long ago were looked upon as hopeless, now come under the category of curable affections. I therefore thought it would be of interest if I reviewed the subject of joint troubles arising in the course of nerve disease, central and peripheral.

During and after this War, as in the case of the Boer War, there will be many cases of central and peripheral nerve injury with associated joint trouble. It is essential that we should ever be mindful of the evidences of those dystrophies which careful observation will elicit. Overlooking symptoms of these disorders is fatal to the well-being of the sufferer, and brings great discredit on those who undertake the treatment of grave nerve lesions.

There are three types of what, in 1881, I called "arthritis neurotica," the first being due to peripheral nerve injury, the second to central injury, and the third to affection of the cord in the absence of trauma.

I shall discuss in a subsequent paper the class representing the third type; it includes the joint troubles associated with tabes dorsalis and syringomyelia.

I will deal first with the question of arthritis of peripheral

origin, giving only one example :—

INJURY OF POSTERIOR INTEROSSEOUS NERVE, FOLLOWED BY ARTHRITIS OF THE PHALANGEAL AND METACARPO-PHALANGEAL JOINTS—RECOVERY.

J. C., aged 18 years, came under my care two months after the receipt of a severe lacerated wound on the dorsal aspect of forearm. Union had taken place, leaving a deep, irregular cicatrix, many points of which were very painful; there was a doughy œdema of the hand and forearm; several vesicles, as large as a split pea, appeared on the flexor aspect of the wrist. The patient was unable to move the fingers, and the wrist-joint, which was considerably enlarged, could not be moved without severe pain. The boy was naturally of a strong constitution, but, since the joint trouble commenced, he had failed in strength considerably.

Treatment.—I divided the nerve filaments going to the cicatrix subcutaneously, and at the same time rendered the structure as movable as possible by raising it at depressed points. I then ordered a mixture of oleate of mercury and extract of belladonna to be rubbed over the part operated upon. In the course of a few days, the pains of the joints disappeared, and in ten days the joints were movable and painless.

1st. The lesions followed partial rather than complete nerve destruction.

2nd. In traumatic cases, the symptoms appeared at the period of cicatrization.

3rd. The arthritis, unless arising from irritation of pelvic or abdominal viscera, is for a long time unilateral.

4th. The symptoms resemble those of the affections styled scarlatinal, alcoholic, and rheumatic arthritis.

5th. They are usually accompanied by chorea, herpes, neuritis, with which they run a parallel course.

6th. When the nerve irritation is removed, a rapid disappearance of pain takes place, and gradual restoration of the joint function sets in.

The manner in which peripheral affections can produce central disturbance is variously explained. Thus, Leyden and Lewisson suppose that inflammation is propagated along the nerves to the cord. Tiesler concludes, from his experiments, that inflammatory conditions of the cord may be set up by peripheral irritation, without inflammation of the intervening nerve-trunk taking place. Others, again, believe in the metastasis of the inflammatory process. The manner in which the derangement of the cord interferes with the function and nutrition of parts connected with it is explained differently, too, by various authorities. In reference to this question, the

following are the views put forward in explanation :—

- (a) Charcot believed that trophic disturbances arose from the withdrawal of an influence, transmitted under normal conditions from the so-called trophic centres to the periphery.
- (b) Schiff looked upon the affection as the result of vasomotor paralysis.
- (c) Samuel believed that irritation of spinal trophic nerves is accountable for the peripheral lesions.
- (d) Remak attributed the articular trouble to an affection of the sympathetic ganglia; while others, with Lewisson, hold that, after the cord becomes affected, a descending neuritis occurs, leading to the dystrophy, by rendering transmissions of normal impulses impossible.
- (e) Paget drew attention to the symptoms in injuries in civil life, and his words well describe the condition and the knowledge that was then possessed with regard to it. "Glossy fingers appear to be a sign of peculiarly impaired nutrition and circulation due to the injury of nerves. They are not observed in all cases of injured nerves, and I cannot tell what are the peculiar conditions of the cases in which they are found, but they are a very notable sign, and are always associated, I think, with distressing pain and disability. In well-marked cases, the fingers which are affected are usually tapering, smooth, hairless, almost devoid of wrinkles, glossy, pink, or ruddy, or blotched as if with permanent chilblains. They are commonly also painful, especially on motion, and the pain often extends from them up the arm."

The cases upon which this description was based were instances of incomplete physiological division, or in which, as in many of my cases, nerve filaments had become fixed in scar tissue.

In several of the cases under my care just returned from the front, especially those who had taken part in the battle of Neuve Chapelle, arthritic symptoms predominated when

bullet or shrapnel pierced, rubbed, or lacerated a large nerve trunk. I have not seen these trophic manifestations when a peripheral nerve has been severed, unless the nerve ends became bulbous or became caught up in the healing tissue.

I recently examined a soldier, who had received a bullet wound of the right thigh just behind the great trochanter. An arthritis of the right knee has gradually come on apparently without cause, the local signs are exactly such as I have described above. On examination, I found the sciatic and its branches greatly enlarged, very tender, and pressure along their line produced spasm of the thigh and leg muscles. This is no doubt an example of arthritis neurotica of peripheral origin.

We now come to the study of joint troubles arising in the course of traumatic affections of the cord or its membranes. I shall present only one out of many typical cases which have come under my notice since 1880, when I first entered on a long and earnest study of this subject.

This case was reported by Mr. Alfred Smyth, at the time my assistant.

PARAPLEGIA ARISING FROM SPINAL INJURY AND ACCOMPANIED BY SEVERE
INFLAMMATION OF ANKLES, KNEES, AND HIPS; RECOVERY.

Thomas F., aged 35 years, seaman, admitted to St. Vincent's Hospital, under Mr. McArdle's care, on October 3. He had never any serious illness until January 23, when he fell through the hold of a vessel. In falling, he struck a plank placed between decks, and then fell heavily to the lower deck, where his spine came in contact with a log. He recovered himself a moment after the fall, and stood up. He would have fallen again, only the captain and another walked him about, "but life," to use his own expression, "was gradually leaving his legs." They laid him on some canvas, where he remained exposed to the cold for some hours; he was then taken ashore and brought home, a distance of two miles, where he was seen by a doctor, who recommended him to the county infirmary. The symptoms first noticed were: loss of power in the legs, inability to pass water, dizziness in the head, stiffness in left arm, and a sensation as if a cord were tied around his waist. On the second morning after the accident, the upper extremities became affected, the left side being in a worse condition than the right. A catheter was passed, purgatives and enemata administered, leeches applied to the back, and iodide of potassium and bark given internally. This treatment had the effect of partially restoring the use of the arms, and entirely the power of the bladder. Finding no further improvement, however, he came to St. Vincent's

Hospital, nine months after the accident. On admission, he was found pale and emaciated, unable to make the slightest movement, except with his head, left arm, intercostal and abdominal muscles, breathing difficult, total loss of power in legs, muscles of back in a state of spastic rigidity as well as those of left arm, which was in a flexed position. It was impossible to place him in a sitting posture. There was no anæsthesia, but he complained of a peculiar prickling sensation in his legs and feet, which were always cold. His legs appeared slightly swollen, pressure produced pitting down to the bone, and joints (knees and ankles) were greatly enlarged, painful, and crepitant. There was a brawny feel about the joints, and slight effusion into the synovial cavity; all the furrows about them were quite obliterated, and movement of them impossible. The muscles were quite wasted, but responded to electrical stimuli; the skin was thick and scaly, leaving the inner and anterior part of the leg, the inner and dorsal surface of foot, covered by great patches of ichthyosis. A large cicatrix remained after an eschar which had formed over the coccyx; there was a considerable swelling over the last cervical and the upper dorsal vertebræ, pressure on which caused severe pain along his arms. Heart normal, pulse 80, temperature 97°, respiration normal, patella reflex exaggerated on both sides, cremasteric reflex slightly marked on right side, none on left, abdominal and pectoral reflexes absent; on applying cold to spine, no abdominal sensations.

Hardly a session passes that several cases of this class do not come under our observation, and so I shall point out the characters which distinguish it from those affections which are liable to be mistaken for it. In a small percentage of cases of locomotor ataxia, arthritic affections arise, but they are painless—they occur before paralysis sets in, and pass rapidly onwards to the production of loose joints. In neurotic arthritis, on the other hand, this state of things is all reversed. The characters which distinguish it from gouty and rheumatic inflammation may be tabulated thus:—

- 1st. It is rarely, if ever, accompanied by fever.
- 2nd. It comes on after or with paralysis, and affects only partially or entirely paralysed limbs.
- 3rd. The bones are tender on pressure below the point of spinal lesion.
- 4th. The articular swelling is due to a synovial effusion and periarticular exudation, which fixes the patella if the knee be affected.
- 5th. It is accompanied by a doughy cedema of the limbs, and cutaneous and muscular atrophy.
- 6th. The treatment for gout or rheumatism utterly fails

to afford relief.

- 7th. If the spinal trouble be not sufficient to produce death, the joints are completely restored to functional activity, the pain and œdema first disappearing, then the paralysis, and last the thickening and stiffness of joints.

Contrast this with gout, in which there is no paralysis (until inflammation is propagated to the cord), no tenderness, except at the joints, especially that of the great toe, no œdema, no muscular or cutaneous atrophy. The attacks are short, usually increasing in severity and leaving permanent traces behind in the shape of deformed joints, in which deposits of urates abound. Rheumatic inflammation is accompanied by high fever, paralysis being only secondary if it occurs at all; it has characteristic acid perspirations, all the joints are affected, there is no œdema, and wasting of the limb occurs, if at all, only from want of use.

There is sufficient dissimilarity here to render the diagnosis easy in the extreme, but when we compare neurotic arthritis with an affection variously styled arthritis deformans, rheumatic arthritis, osteo-arthritis, rheumatic gout, nodosity of the joints, and a host of other names, we evidently have to deal with an affection, the existence of which is evidenced by such varied symptoms that the most conflicting conclusions are drawn therefrom as to the pathology of the affection.

Some who have noted cases similar to mine have called them rheumatic, and one case, which I published in 1884, was under treatment for gout for a considerable time before it came under my care. To my mind, we might as well attempt to make the rheumatic or gouty diathesis account for the muscular and cutaneous degenerations which accompany compression or other simple myelitis, as credit them with the production of articular troubles such as I have described. Here are patients without a trace of rheumatic or gouty tendency, who on receipt of an injury to the spine become paralysed; in a definite time, they develop arthritis with the peculiar symptoms described. After counter-irritation over the spine, and the internal administration of perchloride of mercury, all traces of the trouble disappear. Am

I to call this rheumatic gout? If so, the sooner we investigate the condition of the spinal cord in cases of rheumatic arthritis the better, for in the cases which have come under my notice the ordinary treatment for rheumatic and gouty inflammation was useless, while that directed to the removal of the spinal disabilities was successful.



THE INTERPRETATION OF OPAQUE MEAL SHADOWS IN DISEASES OF THE STOMACH.

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I HAVE thought that some advantage might be gained by recording some recent experiences with this method, so as to indicate what kind of cases are likely to be cleared up by this line of investigation, what interpretation may be put upon the phenomena, and the value at which we may assess them as compared with that of the symptoms and the ordinary physical signs, and to illustrate by a few typical cases. This method has placed within our hands the most valuable method of distinguishing between functional and organic disease of the œsophagus, stomach, and intestine, between the operable and non-operable type of case.

With rare exceptions, ordinary methods are comparatively futile for this purpose. Symptoms are far too illusory. A good free hæmorrhage helps us, but its absence is no criterion of absence of organic disease. Moynihan's syndrome, when complete, may be conclusive, but it is far commoner to find one or more important factors missing. Physical signs are far from satisfactory. Mr. Deanesly's aphorism that when a tumour can be felt it is inoperable, is undoubtedly true. It is no good waiting till you can feel something. If we wait till we feel a tumour, we are done, and so is the patient. Visible peristalsis when present is a most valuable sign, but how seldom is it seen even in undoubted pyloric stenosis.

The diagnosis of dilatation by palpation, percussion, and auscultation is illusory, and there are many pitfalls. Even the evolution of carbon dioxide and inflating the stomach often lead to misleading results. Laboratory methods, even those of Ewald, have limited values. I well remember how, when I was keen on test meals and Gunzberg's reagent, with the dogmatism of youth I condemned a medical man's relative, because I

failed to find free hydrochloric acid in the withdrawn stomach contents; she is living to-day, and well. After all, even in these days, when so many patients will not be satisfied till they are opened, there are still a number who do not like to be opened for functional disease on the off-chance that there may be something else.

It is in suspected cases of ulcer, both gastric and pyloric, and in pyloric obstruction that the opaque meal is so valuable. If Moynihan's syndrome is present in full completeness and perfect precision, without any varying from day to day, the abdomen might reasonably be explored without having recourse to opaque meals. In one such case recently sent to me for an opaque meal, I advised that he might quite safely save himself the cost of an opaque meal, and have the operation performed straight away. The ulcer was found, and he had no further trouble.

But in the majority of suspected cases of duodenal ulcer, many factors are missing. The time of onset of the pain will vary within wide limits; the nocturnal pain may be missing, or perhaps be the only symptom. In gastric ulcer, even hæmatemesis and melæna are insufficient to establish a diagnosis, and this diagnosis is often made upon most flimsy grounds.

Improved technique has greatly enhanced the value of the opaque meal. At a meeting of the Royal Society of Medicine about 18 months ago, Dr. Reginald Morton led off a symposium on the technique of opaque meals with the idea of trying to co-ordinate the various methods then employed. Certain lines of technique were determined upon, and a committee was appointed to investigate the matter more thoroughly and report at a subsequent meeting. This report has just been presented at the last meeting of the Electro-therapeutic Section. Since the former meeting, I have followed the lines suggested.

Briefly, the technique may be described as follows:—The meal consists of 3 oz. barium sulphate, pure from soluble salts, 2 oz. bread cut into small cubes, and 8 oz. milk which is boiled, mixed with the barium sulphate, and poured on the bread, sugar being added to taste. No breakfast is taken before meal. The shadow is examined during and after deglutition, and again

after 4 hours, 8 hours, and 24 hours. No additional food is taken until the examination after 4 hours has been made. The movements of the stomach are carefully examined for a considerable period at each examination.

The method of entering the stomach is important. The stomach bubble can generally be distinguished before the food is taken (Fig. 1 (*a*)). The food then slides down to the right or mesial side of the bubble (*b*, *c*), and forms an inverted

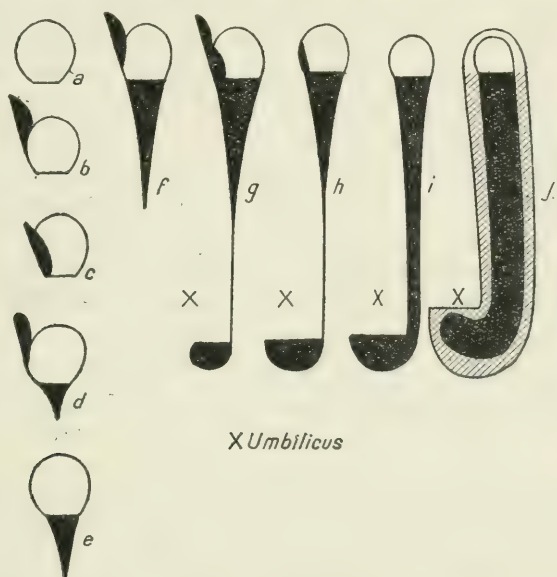


Fig. 1 (*half scale*).

wedge (*d*) beneath the bubble. When the second bolus slides down the wedge elongates (*d*, *e*), and the apical angle gets more acute. With successive boluses, the inverted wedge shape is maintained, portions slipping down to the fundus, until the apex of the wedge joins the fundus mass, and forms a slender J. The upper limb of the J thickens, and the fundus segment becomes more globular; when the full meal is taken, the general J-shape is retained for a time, gentle peristaltic waves passing over it, but the food gradually settles down, forming a truncated J or a hemispherical mass.

Normally, no food is seen passing through the pylorus, though a stream of very fine particles actually passes; a vague cloud beyond can be seen in a rapid exposure, and sometimes

even on the screen. In 4 hours, two-thirds of the stomach contents should have gone, and the remainder should be either quiescent or presenting gentle movements. The wave should not bisect or nearly bisect the shadow. There should be food in the ileum and cæcum, generally none in the jejunum, which from an X-ray point of view generally deserves its name. In 8 hours, the stomach should be empty, and the food collected in the ileum, cæcum and first part of the ascending colon. In 24 hours there is generally half the food in the ascending colon and the other half in the sigmoid and rectum, or even in the outer world. It is infrequent to catch it in the transverse colon, and when one does, this part of the gut is prolapsed, often right down to the pubes.

At my house, I use the cylinder diaphragm, letting the end of the cylinder almost touch the patient's back, and find that by this method I can get much better definition. At the hospital, I use a diascope, which, while presenting many conveniences, has the tube too far away, necessitating more current and greater strain on the tube. There is no cylinder diaphragm, and so less definition, though at the edge of the rectangular diaphragm, definition can be obtained along this line, though not over the whole field. Probably the Grid diaphragm that has been recently put on the market, and which is an expansion of Tousey's cellular diaphragm, will be a great improvement in getting definition. On the whole, radiographs are of secondary importance. The frequent change in form of the shadow is more important than a few odd phases caught on the plate, though for such things as the pyloric cap, the shadow of an ulcer, and the shadow of the appendix, a radiograph of fair rapidity must be obtained.

The contour of the shadow is sketched on the lead-glass plate covering the screen by an oil pencil. I have been accustomed to use different coloured pencils to catch the phases of the movements. Unfortunately, the choice of the colours of oil pencils is limited, and I believe, with my last order I cleared out the stock of the instrument maker, this type of pencil being the product of an enemy country. I have three colours at home, but only two at the hospital, but by using continuous contours for one phase and broken contours for the next phase, one can double the number of contours obtainable,

so that six contours can be obtained on the glass. They can then be transferred to the diaphanous paper where the polychrome effect can be developed more fully, and so when the eye has become accustomed to the interpretation of these polychrome contours, the actual movements can be reproduced mentally at will, with almost the realism of the bioscope. Some of these tracings were shown at the March meeting of the Electro-therapeutic Section of the Royal Society of Medicine.

Instead of giving a text-book description of the changes seen in disease, I have thought that the better plan would be to give a series of recent illustrative cases showing the tracings made by my polychrome method, explaining what I considered their significance, recording the findings at operations and the subsequent history.*

As most of the examinations were entered upon without any definite bias, I thought it best to take them as they occurred, instead of classifying them, so as to place the reader in the same position as the examiner, in order that he may form his own opinion as he reads without the bias given by a headline with the diagnosis. Then for his subsequent reference a table is added at the end.

CASE I.—Mrs. B., æt. 50, butcher. She had pain in the epigastrium half-an-hour after meal, followed by vomiting, which completely moved the pain. Considerable wasting for four months. Sometimes the pain struck through to the back and scapula. She was under Dr. Waddell, of Coseley, and had seen Dr. Emmanuel, of Birmingham, who with Dr. Waddell considered it a case of gall-stones. Dr. Waddell sent her to Mr. Deanesly with a view to operation, but the awe of the knife caused her to turn aside from the path of rectitude, and she saw me first. I thought it a gastric case

* At the meeting at which this paper was read I showed all the tracings on the screen by means of a Ballopticon lantern, kindly lent by the Committee of the Wolverhampton Art School, and their number was 48. From these I have made a selection showing the most important of the phases, and have added four other interesting cases that have occurred since the reading of the paper. Where the stomach outlines are shown in subsequent pages with two or more tracings to indicate the different phases of the movements, each tracing was originally drawn in a different colour. Here, instead of colour, the printer has employed the cross hatching method, which, while very good, lacks the vividness of the colour. Readers are advised to fill in the cross hatchings with differently coloured chalk pencils, being careful to keep one colour to each kind of hatching, in the same way as geologists are accustomed to colour the cross-hatched maps of their publications.

rather than one of gall-stones, and gave her an opaque meal.

I have not a deglutition tracing, but that taken immediately after

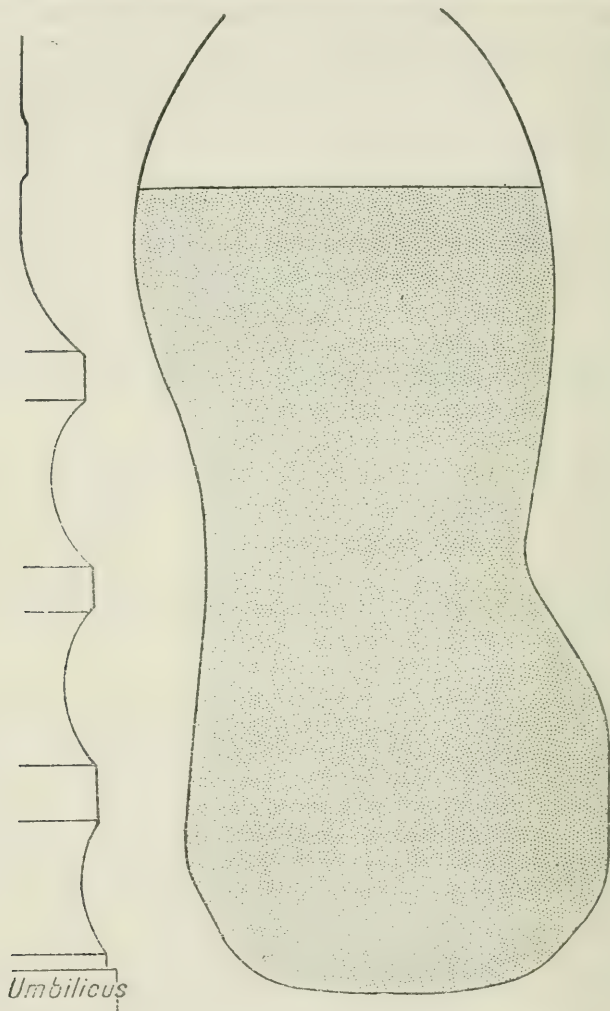


Fig. 2 (*two-thirds scale*).—Mrs. B., *immediately*.

(Fig. 2) showed a subcylindrical shadow of considerable length, reaching down to the umbilicus. Note, however, that the tail of the J is not there. I may say at once that it proved to be an hour-glass stomach, though I did not diagnose it, but on looking back, I think I ought to have suspected it, for the fundus is distinctly high. This shadow, then, is the cardiac sac, which is filled, but nothing has yet passed into the stenosed opening into the pyloric sac, which would lie over and below the

umbilicus. Four hours after (Fig. 3), two-thirds at least had left the cardiac sac, and is present partly in the pyloric sac in two masses, and

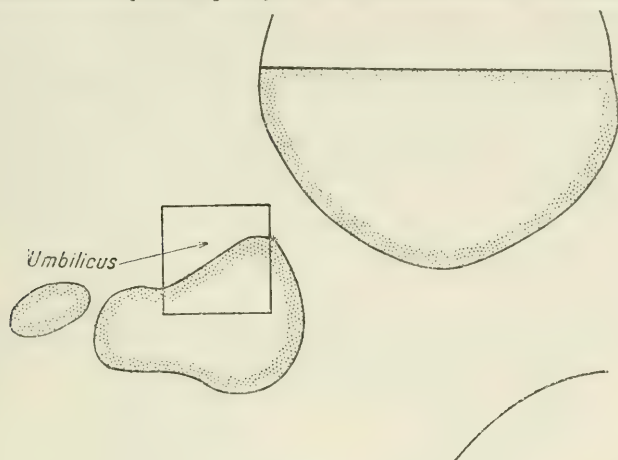


Fig. 3 (half scale).—Mrs. B., 4 hours after.

partly in the cæcum. In 8 hours, the food in the cardiac sac is just as large, nothing has passed through, but there are only two small fragments in the pyloric sac. Food in ileum and cæcum. Now, at 24 hours, comes the

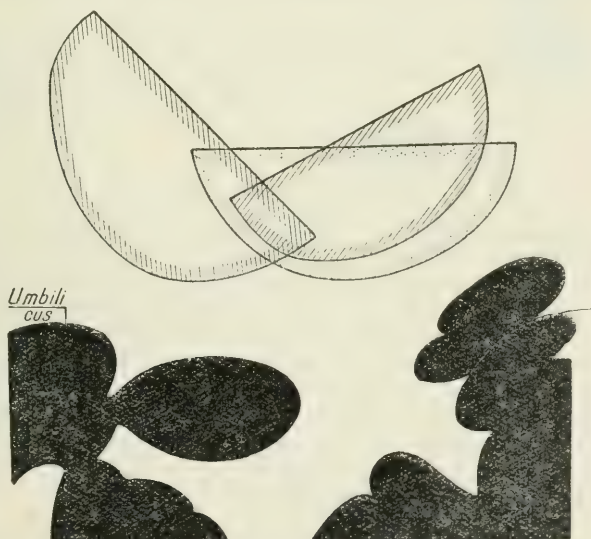


Fig. 4 (half scale).—Mrs. B., 24 hours after meal.

remarkable scene (Fig. 4). That which I then took to be the stomach, but now is seen to be the cardiac sac, was not much emptier than at 4 hours,

but it was in very active movement. It tossed about like a small boat on a heavy sea. In fact, if it had been a small boat it must have capsized, the cycles lasted about three seconds. At this point I diagnosed stenosis of the pylorus. At 36 hours, the stomach, or rather its cardiac sac, has nearly, but not quite, emptied itself. I then sent her on to Mr. Deanesly, and he also thought it was a case of gall-stones, and on opening, searched for them and found none, but, on the other hand, found an hour-glass stomach, with the central stricture very tightly stenosed, evidently the site of an old ulcer, and would not admit the little finger. The pylorus was tightly constricted, but not so much, which is what one would expect from the tracings. Mr. Deanesly excised the stricture, united the ends, and made a gastro-enterostomy opening from the cardiac sac to the jejunum; the patient made a complete recovery without a bad symptom.

CASE 2.—Miss B., æt. 40, trained midwife, was sent to me by Mr. Cholmeley for an opaque meal. She had very severe pain in epigastrium and left

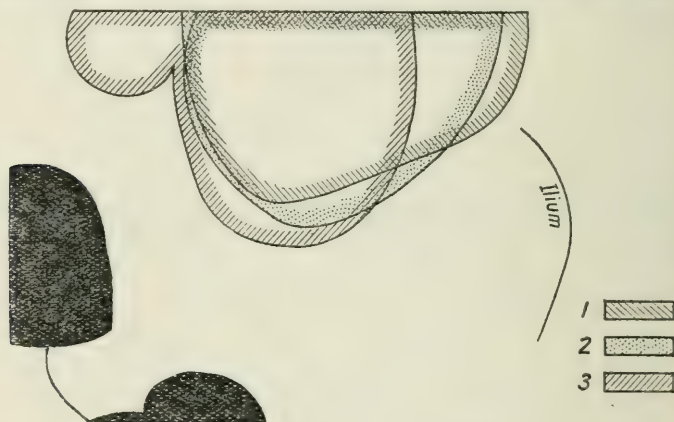


Fig. 5 (half scale).—Miss B., 4 hours after.

hypocondrium, not related to meals, and can take nothing but milk and Benger's food, having no appetite for anything else. Pain often increased by food. Results of opaque meal:—Deglutition, stomach not quite empty, and fragments of food creep slowly down each side and lodge in the hemispherical fundus. Afterwards the food settled into the fundus rapidly. At 4 hours, the stomach was in violent movement, there being rapid changes of form (Fig. 5). Half of meal retained 9 hours. 24 hours stomach empty. I regarded it as a case of ulcer. Mr. Cholmeley opened the abdomen, and found a gastric ulcer adherent to the pancreas, the surface of the latter forming the floor of the ulcer. He removed and stitched up the ulcer, and she has had no pain since.

CASE 3.—W. H. G., æt. 38, warehouseman, came to me complaining of severe pain in the left epigastrium, right round to the right hypocondrium, the direction of the pain appearing to follow a course parallel to and just below the costal margin. He is often severely doubled up. The pain comes on an hour or later after meals, sometimes even

2½ hours. No hunger pains. No relief of pain by meals. No regular waking by pain at nights, but occasionally it will do so, and then it is always at 4 a.m. Has pyrosis, but never vomiting. He distinguishes two kinds of pain, the severe colicky pain already described, which occurs once in six weeks, and a slight epigastric pain that occurs every day. He has been ill for three years. Twenty years ago he had peritonitis. Nine years ago he had a crush of epigastrium on a stop block. Opaque meal. Stomach typical J form. At 4 hours very much had passed, chiefly into small intestine. Stomach moving vigorously, and a little later I took another tracing, which showed violent movement often bisecting the

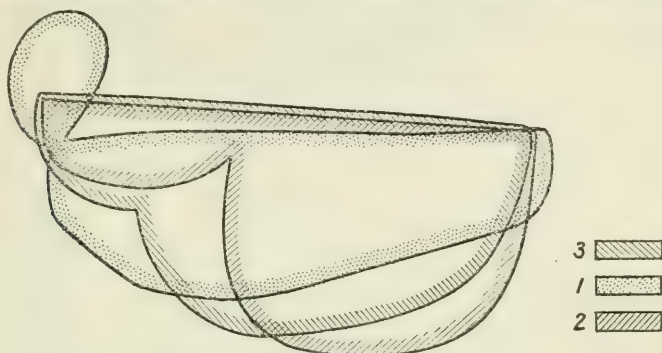


Fig. 6 (*four-fifths scale*).—W. H. G., 4 hours.

shadow, each cycle occupying a few seconds, and at the end of the cycle small fragments seemed to rise up but subside again (Fig. 6). While this observation was being made, he said that he was experiencing the severe type of pain. By the eighth hour, the stomach had emptied. I regarded it as a case of pyloric obstruction and asked Mr. Cholmeley to explore.

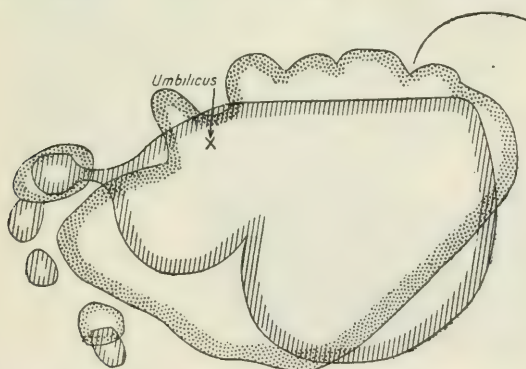


Fig. 7 (*one-third scale*).—Miss D., immediately after.

He found some old adhesions, peritonitis had hitched up the pylorus to the under surface of the liver, causing some stenosis. He released some of the adhesions. Since then he has lost his severe colicky pains, though he

occasionally gets a slight epigastric pain when he has constipation.

CASE 4.—Miss D., æt. 32, came to me with a four years' history of

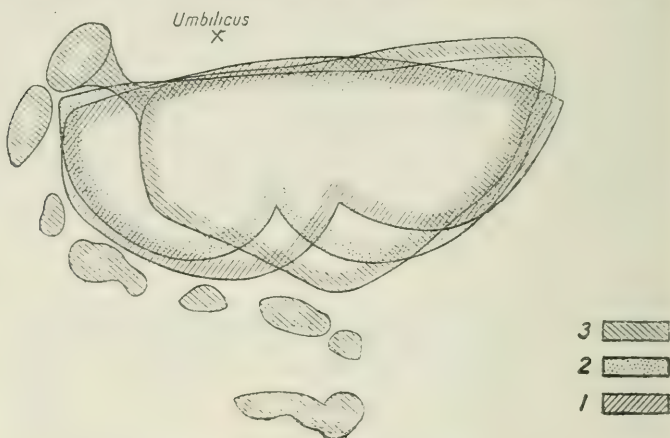


Fig. 8 (two-fifths scale).—Miss D., immediately after Fig. 7.

pain immediately after meals, always vomiting an hour afterwards, relieving the pain but not entirely. I gave her the meal. Deglutition normal, but immediately after, the meal settled in the fundus, which

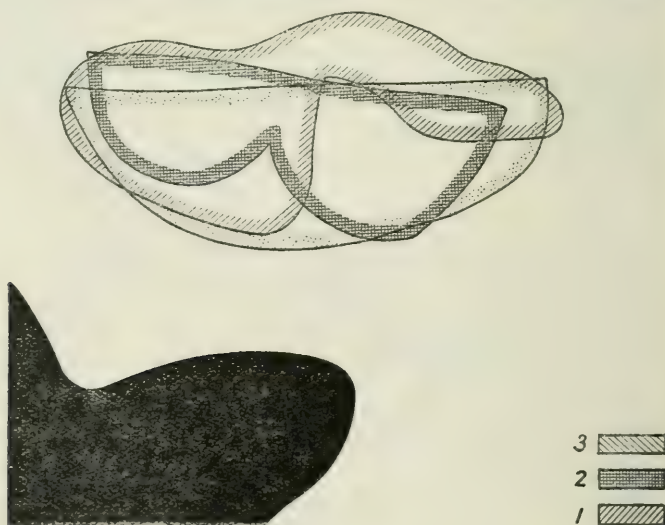


Fig. 9 (half scale).—Miss D., 4 hours (i) 1, 2, 3 pause, 1, 2, 3 pause, etc. became crenated all over, sending chunks of food through the pylorus (Fig. 7). It then commenced a violent peristalsis, the waves biting deeply into the shadow, and more chunks found their way into and down the

duodenum. Another tracing (Fig. 8) taken shortly after showed the same process and the duodenal feeding continuing and the boluses actually turning the corner of the duodeno-jejunal fold. This is Barclay's classical

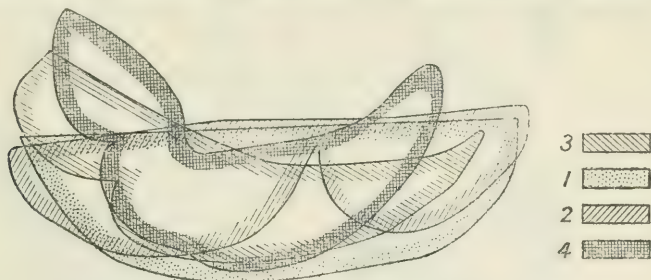


Fig. 10 (half scale).—Miss D., 4 hours (ii) 1, 2, 3 and 4 last 12 secs., then pause for 6 secs.

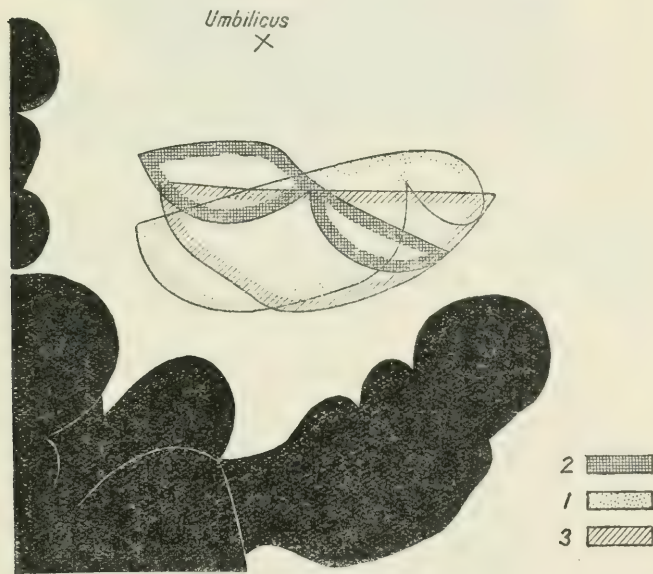


Fig. 11 (half scale).—Miss D., 8 hours (i).

symptom, which he says is pathognomonic of duodenal ulceration. At 4 hours, the stomach was in violent movement and contortion (Fig. 9). A second more elaborate tracing shows a cycle which occupied 12 seconds, followed by a pause of 6 seconds, with marked bisection of the shadows (Fig. 10). At 8 hours, the violent movements and contortions were still going on, with bisection of the shadow (Figs. 11, 12).

I diagnosed duodenal ulcer and asked Mr. Deanesly to explore. He found a duodenal ulcer just beyond the pylorus, and an ulcer of the stomach adherent to the stomach like Case 2, with the pancreas forming the floor. He removed the gastric ulcer, stitched it up, and did a gastro-

enterostomy; the patient has not had any bad symptoms since.

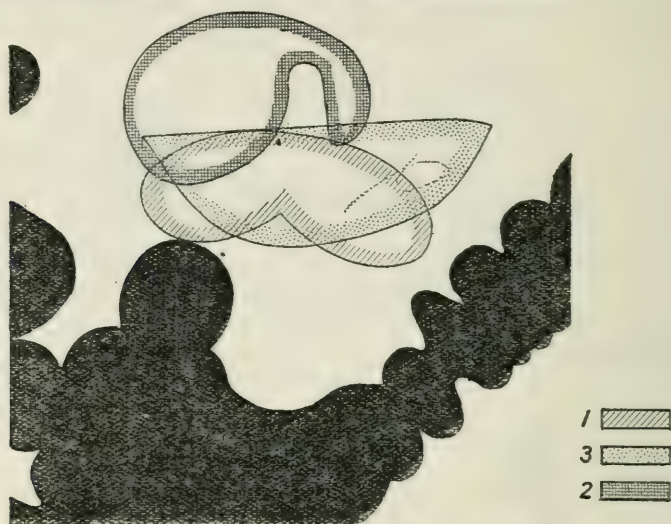


Fig. 12 (*half scale*). Miss D., 8 hours (ii).

CASE 5.--Mrs. T. K. F., æt. 48, a patient of Dr. Allen, of Hurst Hill, has had for four months' pain in epigastrium after almost every meal with vomiting, slightly relieving, but by no means removing the pain, which lasts for hours. I gave her an opaque meal, and every examination showed the stomach to be normal. Deglutition normal, immediately

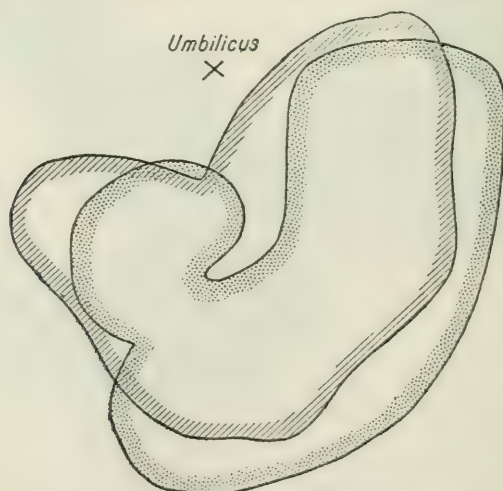


Fig. 13 (*half scale*). E. S., immediately after.

after and 20 minutes after normal. In 4 hours, small quantity in stomach, which had disappeared in 8 hours, and then before 24 hours

she vomited very severely and could not come to my house for examination. Vomited very severely and almost continuously after for several days. I felt that there must be some organic mischief, though it did not

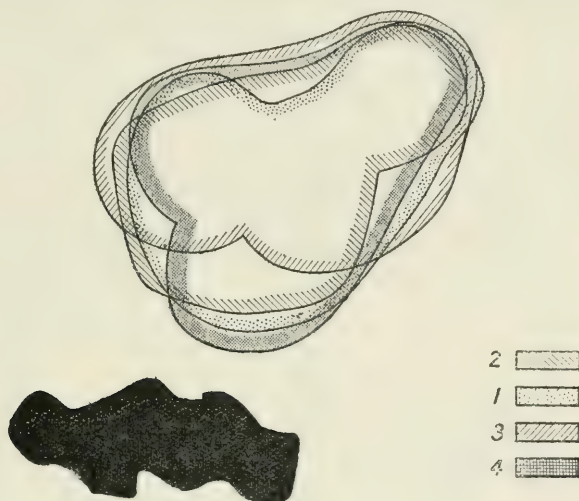


Fig. 14 (*half scale*).—E. S., $3\frac{1}{2}$ hours.

lie in the alimentary tract, so I asked Mr. Deanesly to explore, and he found that the stomach was normal, but the gall-bladder was full of stones, and after removal she made a complete recovery. This is a useful case

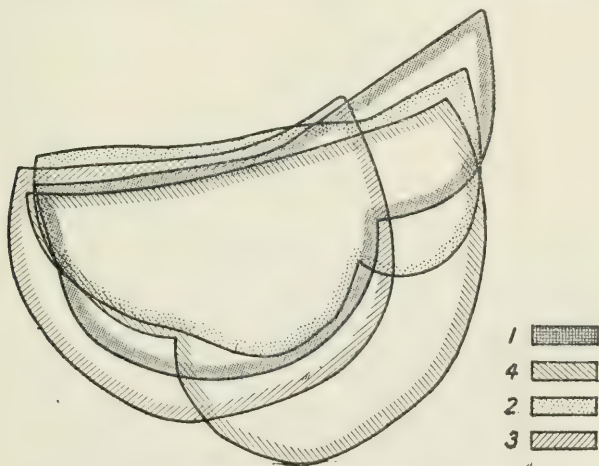


Fig. 15 (*four-fifths scale*).—E. S., 8 hours.

to show the value of the opaque meal when the evidence is negative.

Two cases in which my diagnosis was not confirmed:—

CASE 6.—E. S., æt. 32, was sent to me by Mr. Deanesly for opaque meal. Eight weeks ago, she had developed a sharp pain at bottom of sternum, which

came on at 4 a.m. and woke her; she was generally free all day. Opaque meal:—Deglutition nil. Immediately after (Fig. 13), pars pylorica was contracting freely, later was caught in H-shaped condition. $3\frac{1}{2}$ hours, violently contracting, cycle=10 secs., but the waves do not tend to bisect the shadow (Fig. 14). 8 hours, stomach still contracting violently, but waves not excessively deep (Fig. 15). Very little progress made in emptying from 4 to 8 hours. 24 hours, stomach empty. Food in cæcum and sigmoid. I diagnosed, with some hesitation, pyloric obstruction. Mr. Deanesly found no ulcer of stomach or duodenum and no dilatation. Pylorus admitted thumb. Some non-inflammatory adhesions divided around pylorus and gall-bladder, and appendix removed.

CASE 7.—W. C., æt 24, was sent by Dr. Davidson, constant pain from umbilicus to back. Vomits immediately after meals. Opaque meal:—Deglutition normal. Immediately after, gentle waves down body, sharp contraction of

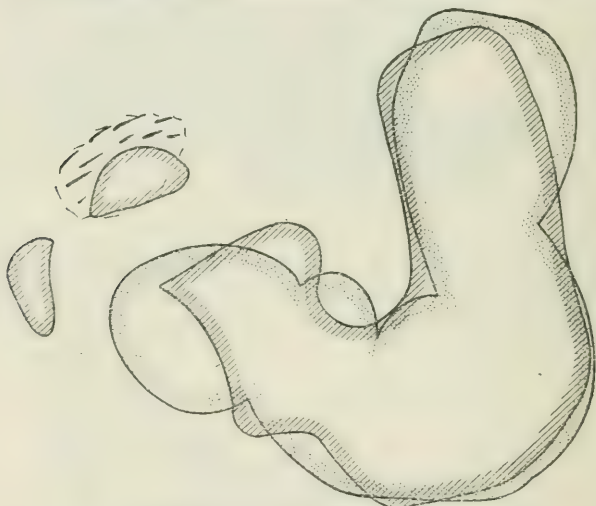


Fig. 16 (half scale).—W. C., $\frac{3}{4}$ hour.

pars pylorica 10 minutes later (Fig. 16); pars pylorica more violently contracting, sending out ill-defined stream, shown also in radiograph. In 45 minutes pyloric region very active and two chunks seen in duodenum. At 1 hour, still violent contraction of pars pylorica, and several chunks in duodenum, and quantity of food in jejunum and ileum. At $4\frac{1}{2}$ hours, stomach contracting freely and in irregular fashion. 8 and 14 hours, stomach empty. I diagnosed this as duodenal irritation, though the emptying into the duodenum (Barclay's symptom) was not so typical as in the Case 4. However, Mr. Deanesly explored, and could not find any external evidence of gastric or duodenal ulcer, nor organic pyloric stenosis. The gall-bladder was explored, and the appendix removed.

The last two cases were diagnosed by me from the opaque meals as definite organic disease, but nothing was found. This does not necessarily mean that the diagnosis was incorrect, and that the observations were faulty or misinterpreted. It is true

that in neither were the phenomena so definite as in the other cases, the shadows were not so deeply bitten by the waves, and in the second of these cases the ejection of the chunks was not nearly so definite, regular, and constant as in the

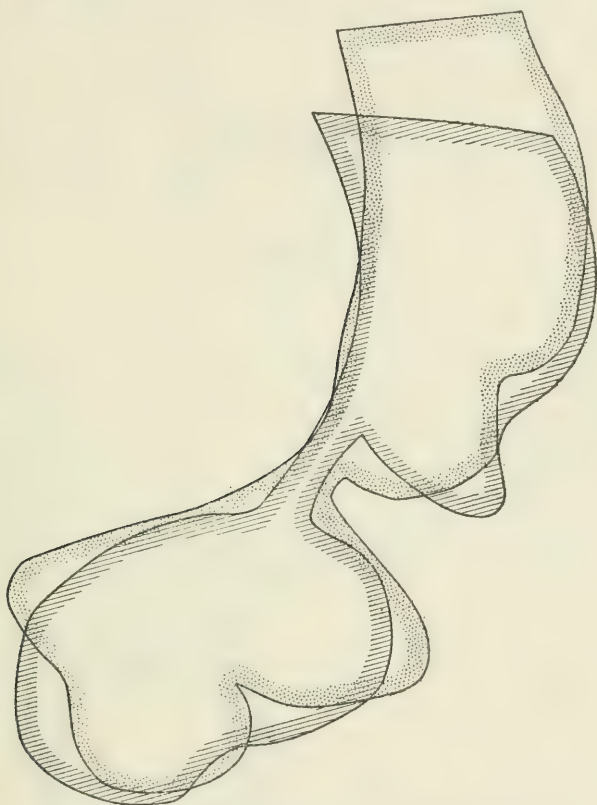


Fig. 17 (*half scale*).—Mrs. F. R., *immediately after*.

other case ; this will clearly affect my judgement in subsequent cases. But it is quite possible that the case E. S. may have been an obstinate spasmodic obstruction that disappeared under the anæsthetic, or a stricture from the observed bands (which were removed), but in which the stricture only became effective under certain circumstances, and it might have been in many respects like the case W. H. G. That case may still be one of duodenal irritation, a mere abrasion without any indurated base, which could not be felt through the wall of the gut, and one quite capable of healing without surgical aid.

CASE 8.—Mrs. F. R., æt. 40, came to me complaining of pain in

epigastrium immediately after meals, lasting two hours. Vomits after everything she takes, the vomiting completely relieving the pain. Six years ago was ill, she stated it was "ulcer of the stomach," for which she had

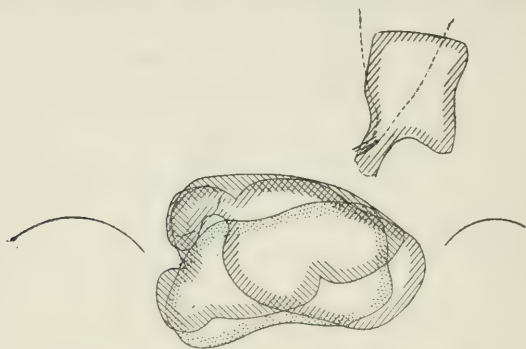


Fig. 18 (*quarter scale*).—Mrs. F. R., *one hour*.

had an operation by Mr. Cholmeley, but this was found on investigation to be a radical cure for hernia. I gave her an opaque meal:—Deglutition, dumb-bell-shaped outline, getting larger at top and bottom end. In a quarter of an hour showed typical hour-glass shape (Fig. 17) with narrow neck, sometimes long, sometimes short, but over a considerable period of watching the two sacs never fused. Very active peristalsis, constantly altering shape and position. At 1 hour the upper shadow was very faint, the lower shadow very dense and in active movement (Fig. 18), but the wave never bisected the shadow. In 4 hours, the stomach had nearly emptied, but there

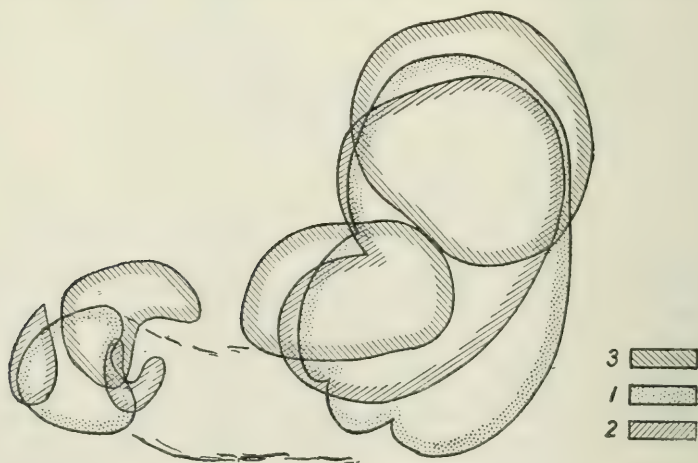


Fig. 19 (*two-thirds scale*).—Mr. A.'s baby, *immediately after*.

was some active movement. In 8 hours, the stomach contents were represented by a very narrow band, which, however, was twisting in a very lively fashion. In 24 hours it was empty. While the diagnosis of

hour-glass stomach was fairly certain, the history of operation for ulcer of stomach six years ago, made me speculate whether it was not a shadow of a gastro-enterostomy, but it is quite unlike the shadow one would expect and from what one gets in this condition, so I decided against it, and this was confirmed when it was ascertained that the operation was for hernia and not for ulcer. I sent her to Mr. Cholmeley, who found an hour-glass cicatrix, the contour of the stomach exactly conforming to the shadows. There were many adhesions to the pancreas and elsewhere, and the lesser sac was obliterated. He made a V-shaped incision through the constriction, which admitted two fingers, and brought the sacs together. She made a good recovery.

CASE 9.—Mr. R. F. A.'s baby, æt. one month three days, was under Dr. A. H. Carter, and did perfectly well until the third week, when he began

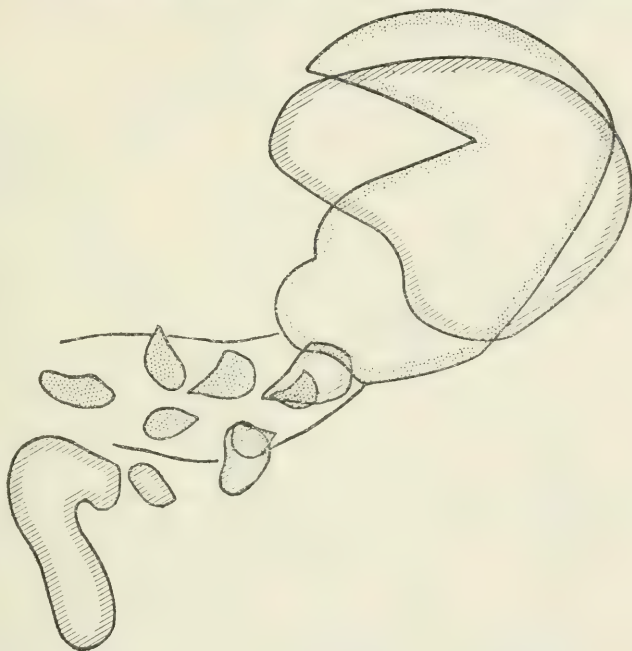


Fig. 20 (*four-fifths scale*).—Mr. A.'s baby.

to vomit. He would take about three feeds well, and then after the next would bring all four feeds back again. Dr. Carter noticed marked visible peristalsis and diagnosed pyloric obstruction. He called in consultation Mr. Deanesly and Dr. Edge, and they all decided that it was a case for an opaque meal, and sent the child to me. I gave him bariuni sulphate added to malted milk. Immediately after, the meal (Fig. 19) was seen to be in two portions, one smaller portion being at the extreme pyloric end with partly stained empty stomach tube between. It was violently contracting. Larger mass often bisected. At 4 hours (Fig. 20) a very small quantity of food seen passing into duodenum. At 8 hours (Fig. 21), food was

in right side of body, violently and rapidly contracting; sometimes forming spherical mass, very black and in great tonic vigour, then

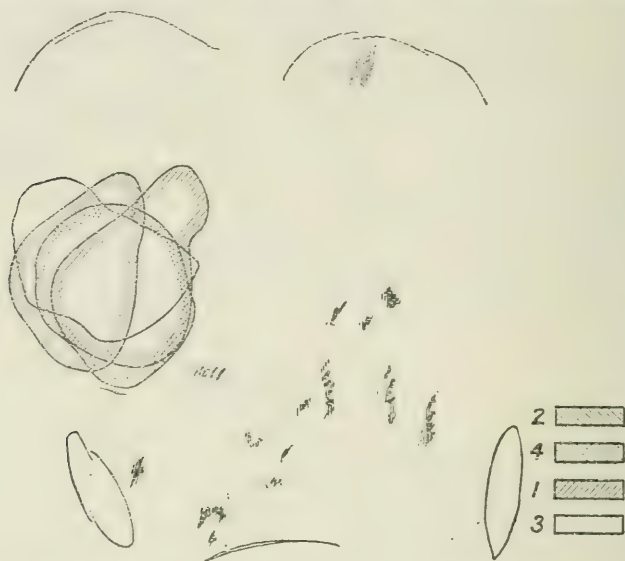


Fig. 21 (half scale).—Mr. A.'s baby, 8 hours. 1. spheroidal stage.



Fig. 22 (half scale).—Mr. A.'s baby, 8 hours, after vomit

assuming pyriform shapes, with less dense shadows, and passing very

small quantities into duodenum. Then vomited, and (Fig. 22) stomach assumed J-shaped outline, was tucked under diaphragm, and lost its turbulence. In 24 hours, most of the meal was seen to be in the stomach, which was in severe contraction (Fig. 23). Outlines of coils seen, and



Fig. 23 (half scale).—Mr. A.'s baby, 24 hours.

fragments of food seen here and there. Mr. Deanesly forthwith explored the abdomen, found the pylorus thickened and obstructed, and did a gastro-enterostomy. He recovered from the first, took his food well, and has gained three pounds.

CASE 10.—B. D., f., æt. 51, was sent to me by Mr. Deanesly. At 28 had hæmatemesis. Two years later had another attack. Has had attacks of pain and vomiting once or twice a year since. Latterly attacks have become more frequent. Onset of last attack five months ago. Severe pain after meals, with vomiting relieving pain. Marked tenderness over epigastrium. Opaque meal: Deglutition (Fig. 24). Usual inverted wedge, but spreading laterally without getting lower, forming quadrate body with long narrow spout at mesial side. At 25 minutes (Fig. 25), typical hour-glass stomach form with long narrow neck, $1\frac{3}{4}$ hours (Fig. 26), upper sac half emptied of barium meal, but filled up with milk, which had been given inadvertently. Pyloric sac well filled. In $5\frac{1}{4}$ hours stomach emptied. Mr. Deanesly found large chronic ulcer causing constriction of stomach about middle but nearer the cardiac end. Stomach typically hour-glass.

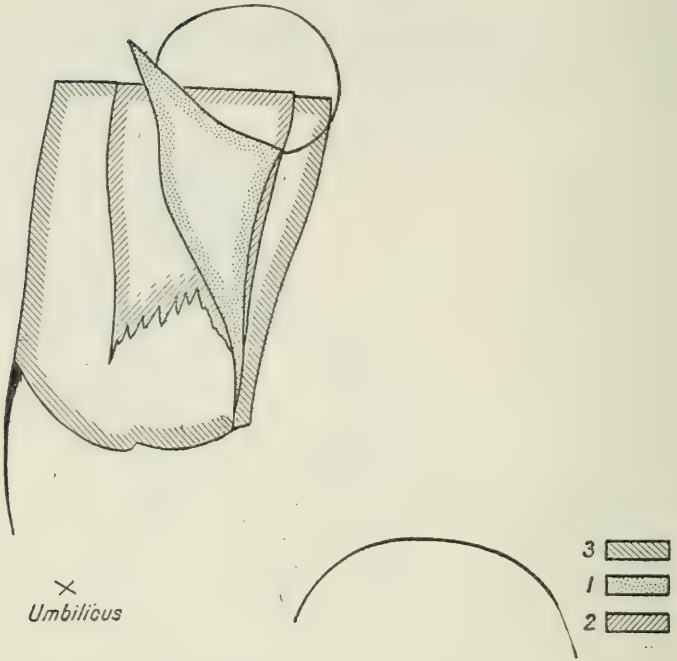


Fig. 24 (half scale).—B. D., Deglutition.

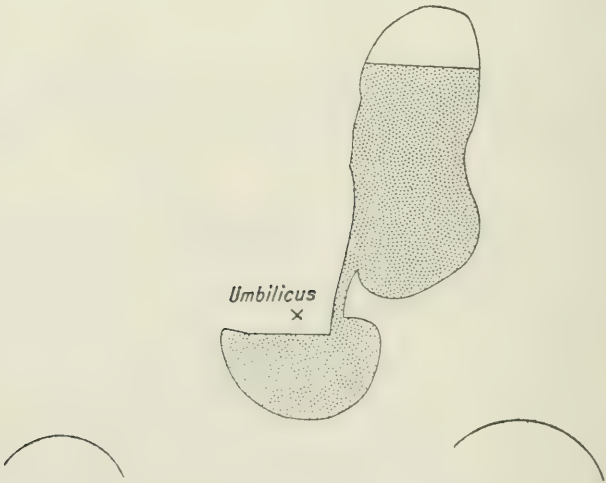


Fig. 25 (quarter scale).—B. D., 25 minutes.

Posterior gastro-enterostomy performed between cardiac sac and jejunum.

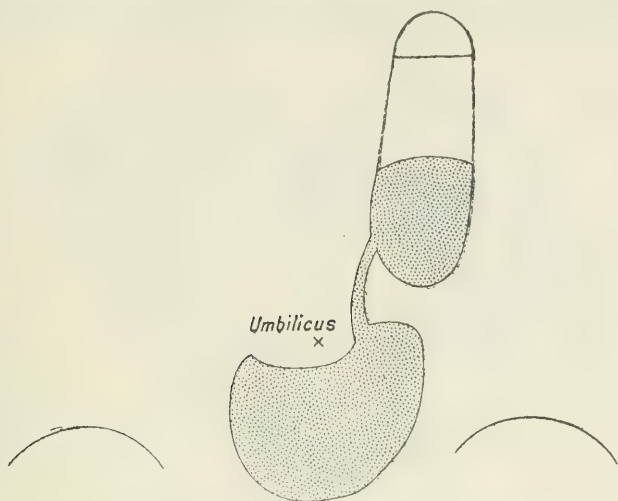


Fig. 26 (*quarter scale*).—B. D., $1\frac{3}{4}$ hours.

Discharged quite fit. No pain.

CASE II.—A. I., m., æt. 34. Pain epigastrium $\frac{1}{2}$ hour after every

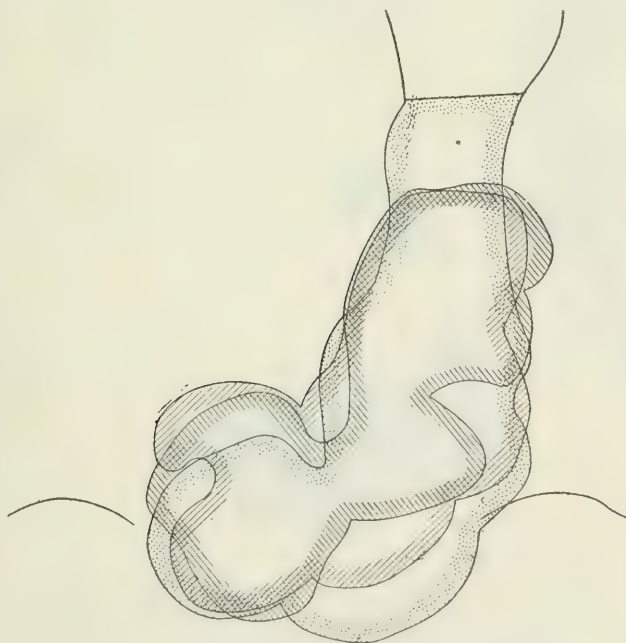


Fig. 27 (*one-third scale*).—A. I., immediately after.

meal; lasts 1 hour. Vomiting completely relieving pain. Opaque meal:—
 Deglutition, normal J. Immediately it was full (Fig. 27) it started very
 active movements, with deeply incised naves. At 1 hour (Fig. 28) very

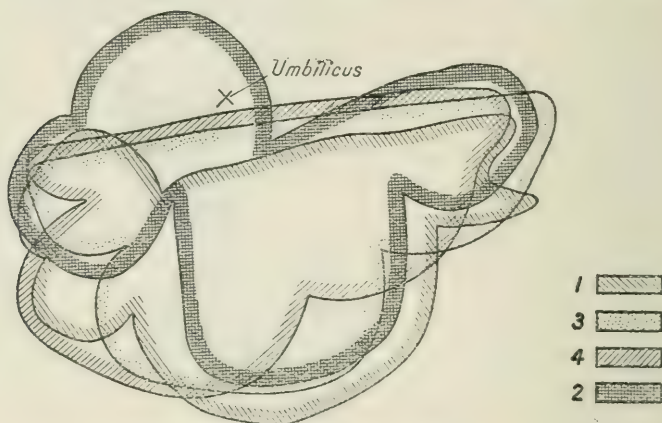


Fig. 28 (half scale).—A. I., 1 hour.

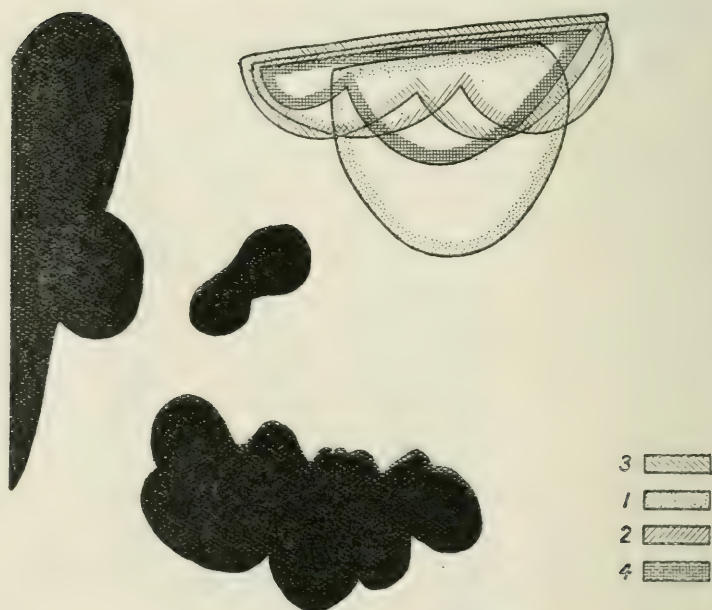


Fig. 29 (two-thirds scale).—A. I., $5\frac{3}{4}$ hours.

active movements. At $5\frac{3}{4}$ hours (Fig. 29) still actively contracting; resting
 stage 5 seconds; contracting stage 5 seconds. At first waves were regular,
 the upper surface of the shadow being level, and waves passed regularly

from left to right along the fundus. About 5 minutes later the shadow began tilting and contorting movements (Fig. 30). At 8 hours the stomach was empty. I diagnosed ulcer of stomach. Mr. Deanesly opened the

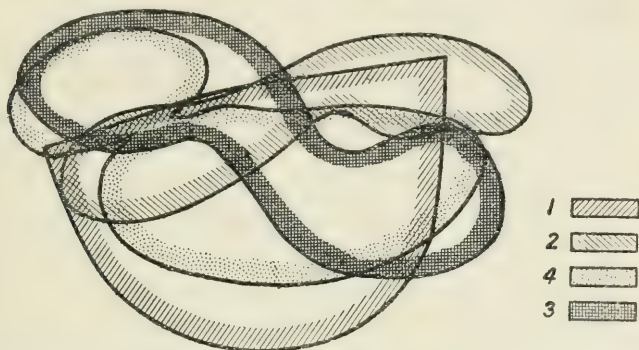


Fig. 30 (full scale).—A. I., 5 $\frac{3}{4}$ hours (ii) 1, *Resting stage*. 2, 3, 4 *Contractile stage*.

abdomen and found the ulcer on the upper margin of the stomach, slightly posterior, and 1 inch from the pylorus. He did a gastro-enterostomy, and the patient has made a good recovery.

There are a fair number of cases which I have examined recently with negative result, and in none of them has subsequent evidence contradicted the negative diagnosis (except in one case of an intestinal lesion), and it would serve no useful purpose to record them.

I have purposely left out the consideration of the diagnosis of œsophageal and intestinal disease (other than duodenal ulcer) by this method, as being too comprehensive for a paper of this kind, and so have limited my scope to that of the stomach only.

These few cases indicate that the method has great advantages over other methods, and is a very valuable adjuvant to them; the time will doubtless arrive when it will be hardly justifiable to omit it.

TABLE OF CASES.

Simple ulcer of stomach, Cases 2, 11.

Hour-glass stomach, Cases 1, 8, 10.

Duodenal ulcer or irritation, Cases 4, 7.*

Pyloric obstruction, Cases 3, 6,* 9.

Stomach negative (gall-stones), Case 5.

* Not confirmed.

SUMMARY AND CONCLUSIONS.

The teaching of these five classes of case may be summarized as follows:—

1. Excessive motility may be defined as the picture seen when a wave passes along a shadow and cuts into it for a distance of half its depth or more; when a wave passes along from one end to the other in 10 seconds or less; and when the long axis of the shadow moves through a considerable angular distance or executes vermicular movements.

2. If the stomach shows excessive motility immediately on the reception of the meal, or in 4 hours, and the stomach is clear in 6 or 8 hours, there is probably peptic ulcer.

3. If there is no excessive motility immediately, but it shows itself in 4 hours, and the stomach is not empty in 8 hours, there is probably pyloric obstruction, especially if there is excessive motility in 8 hours, as well as in 24 hours, in an unemptied stomach.

4. The hour-glass shape is fairly typical, and should show a definite neck or isthmus. If there is a mere constriction, with both sacs in contact, it is probably spasmodic, and should be watched for signs of change.

5. If Barclay's duodenal sign is present, there is probably ulcer of the duodenum, either a "surgical" one or a surface abrasion, impalpable from the outside.



THE TREATMENT OF FIBROIDS BY X-RAYS.

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THE question of the treatment of fibroids has always been a matter of great interest, around which considerable controversy has been waged in the past. The introduction of Röntgen therapy as a means of dealing with certain cases of fibromyomata uteri is likely to renew the controversy. In this country, Röntgen therapy as a method of treatment of certain gynæcological diseases has received but little recognition. Nevertheless, anyone who has had a considerable experience in the treatment of suitable cases of fibroids by X-rays, cannot fail to be impressed with the results, and with the great possibilities of Röntgen therapy in the treatment of certain diseases of women, such as fibroids, chronic metritis, the hæmorrhage of the menopause, certain cases of dysmenorrhœa, and lastly, as a palliative measure, in inoperable carcinoma of the female genital organs.

For the past ten years, a great deal of work has been done on the Continent and in America on this subject. In France and Germany especially, both radiologists and gynæcologists have devoted a great deal of attention to this matter, and a vast amount of literature has been published, together with statistical tables of the results of the treatment. These results are truly remarkable, and their comparative uniformity clearly points to the great value of X-rays as a therapeutical agent in gynæcology. Thus, in the case of myomata uteri we may quote Albers Schonberg (Hamburg), who claims 78 per cent. cures in 33 cases; Runge (Halle), 59·3 per cent. with amenorrhœa, 84·4 favourably influenced, and 15·6 per cent. not influenced in 90 cases; Haenisch (Hamburg), 85 per cent. cured in 34 cases; Graesner (Cologne), 80 per cent. cured in 22 cases; and lastly Kronig, Gauss, and Lembcke, who report

100 per cent. cures in 350 cases treated with their latest technique, which consists in the administration of massive doses suitably filtered at one sitting. As already mentioned, the subject of Röntgen therapy in its relationship to gynaecology has received but little encouragement in this country, and probably, at the present time, the consensus of opinion amongst British gynaecologists is against the adoption of X-rays as a therapeutic agent in those diseases of women, which have been treated most successfully in foreign countries by this means.

The practical experience of the writer has convinced him of the value of X-rays in the treatment of carefully selected gynaecological cases, and he ventures to predict that with the rapid strides the science of radiology is making, Röntgen therapy is destined to take an important place in the treatment of diseases of women.

If X-ray therapy, however, is to be successful, a very careful selection of cases will be necessary, for any error in diagnosis is likely to bring disaster in its wake; furthermore, the closest attention must be paid to every detail of the technique, and the operator must have a sound knowledge of Röntgen therapy not only in respect of dosage, but also in respect of the principles and the working of an X-ray tube. From this, it follows, that if X-ray therapeutics are to take any great part in the treatment of diseases of women, it will be necessary for gynaecologists to devote themselves to the study of radiology from its therapeutic point of view.

Most of the gynaecological cases treated by Röntgen rays have been fibroids. Patients suffering from fibroids, who are submitted to this form of treatment, should be over 39 years of age. The fibroid should be of the intramural variety and of moderate size. Myomata reaching higher than halfway between the umbilicus and symphysis pubis are, in the majority of cases, better dealt with surgically. A medium-sized intramural fibroid, causing brisk menorrhagia and of recent date, will generally be found to be most amenable to X-rays. In such cases, amenorrhœa may confidently be predicted, as well as a rapid diminution in the size of the tumour; indeed, these tumours often disappear completely, at all events so far as any physical examination is

capable of detecting their presence.

Fibroids of old standing, consisting chiefly of fibrous tissue, are less likely to diminish in size than the more vascular and cellular varieties. The diminution in the size of the tumour is brought about in a twofold manner, namely, by the action of the rays upon the ovaries, whereby the Graafian follicles are destroyed, as well as by an action upon the cells of the tumour itself.

Any form of degeneration, innocent or malignant, acts as a contraindication to Röntgen therapy. Fibroids causing pressure symptoms, unless very trivial in nature, should be dealt with surgically, and so, too, should those complicated with disease of the uterine appendages, inflammatory or cystic.

Röntgen therapy is indicated in all cases of myomata in which surgical measures are contraindicated owing to the presence of some general or local condition, such as morbus cordis, advanced nephritis, chronic bronchitis, exophthalmic goitre, diabetes, enlarged thyroid, and arterio-sclerosis.

The treatment should be carried out shortly after the termination of the menstrual period. The first menstruation after treatment may be more excessive than usual; especially is this likely to be the case, if moderate doses have been employed. In certain doses, X-rays are said to have a stimulating effect upon the ovaries, and when there is an increase in the menorrhagia after treatment, it is to be attributed to this stimulating action. It is, therefore, always advisable to warn the patient that her first menstrual period after treatment may be more excessive than usual. The hæmorrhage as a rule gradually stops, each successive period becoming scantier until amenorrhœa is established. In some cases, the interval between the periods is increased at first, without any alteration in the actual amount of hæmorrhage; in others again, the interval may be prolonged, and the hæmorrhage at the same time diminished in quantity. Or again, if the patient has been in the habit of passing many and large clots, she may tell you that they were fewer and not so large as usual.

Pain, when present, is generally relieved quite early in the course of the treatment. This is probably due to a modification of the menstrual blood, whereby its coagulability

is diminished. If the hæmorrhage persists after three or four treatments, it is advisable to reconsider the diagnosis and resort to some other form of treatment.

In a few cases, a recurrence of the hæmorrhage after a varying interval of amenorrhœa has to be recorded. Should the hæmorrhage be mild in amount and occur with a regular monthly periodicity, no further treatment is necessary. In those cases, however, in which the hæmorrhage is excessive, or in which hæmorrhage has recurred without complete disappearance of the tumour, one or two more applications of the rays are called for. The younger the patient, the greater is the liability to the recurrence of the hæmorrhage.

Diminution in the size of the tumour varies considerably in different cases. In some cases, it takes place more or less rapidly, and in others, the diminution is very gradual; yet in others no appreciable change in the size of the tumour can be detected, even often after a period of amenorrhœa of six months' duration. In some cases, the tumour appears to have disappeared entirely, that is to say, as far as a physical examination is capable of detecting its presence. Soft myomata of moderate size with a marked tendency to hæmorrhage, usually disappear rapidly. Naturally, the relief of pressure symptoms, if present, coincides with the period of diminution in the size of the myoma.

Climacteric Phenomena.—In the majority of cases, these are few and slight in character, and do not differ in any way from those observed at the time of the natural menopause. The younger the subject, the more marked are the climacteric manifestations. Bordier suggests, that the mildness of the artificial menopausal symptoms may be due to the fact that the rays do not produce ovarian insufficiency, that is to say, that the internal secretion of the glands is little affected by the rays. Many authors claim that the more gradually a condition of amenorrhœa is produced by X-rays, the less manifest will be the reflex disturbances resulting therefrom.

The marked tonic effect of X-rays on the general health is well illustrated in the case of patients undergoing local treatment for one cause or another. In nearly every case, these patients, before noticing any change in the local con-

ditions, observe a great improvement in their general health. This improvement continues throughout the course of the treatment, and is to be attributed to the relief of symptoms as well as to an improved condition of the blood. Many observers have noted a marked increase in the percentage of hæmoglobin, together with an increase in the number of the red blood-corpuscles. This improvement of the general health, however, is often observed in cases some time before any diminution in the hæmorrhage has taken place. In such cases, the beneficial effects are probably due to some action of the rays upon the blood-contents or the blood-forming organs of the body.

After the administration of the long treatment with moderate doses, patients usually complain of feeling tired for the rest of the day. Especially is this the case after the first treatment. It is therefore advisable, though not absolutely necessary, to prescribe rest in bed for 24 hours after the treatment. This sense of fatigue is sometimes associated with headache, slight nausea, or giddiness, and these symptoms may last 24 hours. Such attacks are said only to occur when the milder doses of X-rays have been administered, and never to occur when the massive doses have been employed.

In the selection of a technique, the operator has a fairly large field to choose from, many methods having been devised; the best known are those of Albers Schönberg, Runge, Kirstein, Bordier, Haenisch, and Freiburg.

The object of all these is to administer a dose of X-rays to the pelvic organs, without causing any damage to the skin and other abdominal viscera. To obtain this end, the rays emitted from the tube are filtered. The filter that has been found most serviceable is a plate of aluminium, 3 m.m. in thickness. Every X-ray tube when in action discharges rays of a soft and hard nature. The hard, penetrating rays are considered to be the effectual therapeutic agent, and are capable of passing through a filter of aluminium, 3 m.m. in thickness. Such rays have no injurious action upon the skin, provided that the exposure is not unduly prolonged, but when the rays impinge upon the filter, certain secondary radiations are set in motion which may have some action upon the skin of an injurious nature. To protect the skin from such

secondary radiations, as well as from any soft rays that may have passed through the aluminium filter, a loofah sponge, several layers of satrap paper, and a chamois leather, are placed immediately over the skin surface to be irradiated.

Each skin area is enclosed by lead plates which effectually protect the surrounding skin ; over this, and covering the whole abdominal area, is placed a thick rubber sheet with a small hole cut in it through which the rays can pass. By the adoption of this method of filtration and protection, it has been found possible to administer as much as 40 \times to each skin area without causing any injurious effects.

By mapping out the lower abdomen into a number of small areas, usually 12, a dose of 240 \times can be administered at one sitting, provided that each area receives 20 \times ; even larger doses than this have been administered.

The dose of X-rays administered is measured in quantities of \times by the Kienböck method, which has been found to be the most convenient, and at the same time the most accurate method as yet devised. The principle of this method is a photographic one. Strips of bromide of silver paper, suitably protected from the light by black wrappers, are placed on the skin surface. These, after the exposure, are developed, and their colour, which is now some shade of black, is compared with a standard scale. Kienböck divides the erythema dose into ten equal parts, which he calls " \times ," thus 10 \times would be the equivalent of one erythema dose. If the exposed strip, when compared with the standard scale, corresponds in colour with tint number 5 on the scale, the patient is said to have received on the surface 5 \times or one-half an erythema dose.

For the measuring of doses greater than 10 \times , a second standard scale has been devised which allows of the estimation of doses from 10 to 45 \times . This second scale shows the effects of X-rays upon bromide of silver paper protected by 5 m.m. of aluminium. When administering doses over 10 \times , this second scale must be used, and the strip placed upon the skin surface must be covered in part by a block of aluminium, 5 m.m. in thickness ; the portion so covered is the part to be compared with the standard scale.

The *advantages* that may be claimed for the treatment are :—

1. It is painless.

2. It avoids the shock of an operation.
3. It does not interfere with the daily life of the patient.
4. In the hands of a skilled operator it is attended with no risk.
5. In the majority of cases the menopausal symptoms are mild in degree.
6. Absence of any mortality attached to it.

The *disadvantages* of the treatment are said to be :—

- (a) Its length of time.
- (b) Its danger to the skin and underlying organs, immediate and remote.
- (c) Its uncertainty.

These disadvantages, when critically examined, can hardly be said in fairness to exist. Thus, the average length of time necessary to effect a cure may be said to be three to four months, which is no longer than what is necessary for a patient to recover thoroughly from an abdominal hysterectomy. Moreover, during this time the patient is able to follow her usual occupation, and her general health commences to improve, usually shortly after the administration of her first dose.

As regards danger to the skin and underlying organs, immediate and remote, with the improved methods of filtration and the treatment carried out by a skilled operator, this can be said hardly to exist. Patients with sensitive skins should be given mild doses at first, and the effect carefully watched. With strict attention to technique, any immediate danger to the skin and underlying organs may practically be eliminated.

With regard to such remote effects as chronic dermatitis, telangiectasis, and injury to the intestinal canal, my own experience does not extend over a sufficient period of time to express any definite opinion upon this matter. As yet, however, I have not met with any such complications, but it must be borne in mind that in the past such remote complications have been met with. They occurred chiefly in the early days of the treatment, before the present methods of filtration and protection had been devised. From a review

of the literature, it would appear that with the administration of hard penetrating rays adequately filtered, the liability to the occurrence of these complications has been reduced to a minimum.

Its uncertainty, by which is meant the power to produce, or not, amenorrhœa and reduction in size of the tumour, varying from diminution in its dimensions to practical disappearance, depends in great part upon the careful selection of the cases submitted to treatment. The indiscriminate treatment of all fibroids by X-rays will certainly bring disaster in its wake. If it is found impossible to bring about amenorrhœa in this way, it will generally be found that the diagnosis is at fault, or that the case is unsuitable, owing to the pathological nature or size of the tumour. In all suitable cases, amenorrhœa may confidently be predicted. As regards diminution in size of the tumour, the prognosis must be more guarded, especially in the case of tumours of large size and of old standing. Tumours of recent date, of moderate size, and softish consistency, are the most amenable to X-rays, and in such conditions a favourable opinion may be expressed with confidence.

CONCLUSIONS.

1. X-rays are useful in the treatment of certain cases of fibroids.
2. Success depends upon the careful selection of cases, and the closest attention to every detail of the technique.
3. Rays of the hardest penetrative nature possible should be used.
4. With very few exceptions, Röntgen therapy should only be recommended in women under 39 years of age.



ORDINARY AND ATYPICAL MIGRAINE IN THEIR RELATION TO OCULAR DEFECTS.

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THE responsibility of errors of refraction in causing headache is now so well recognized that it has become an article of medical belief, and is one of the first causes of which a practitioner thinks when consulted about this symptom. But some of the many other manifestations of eye-strain are less widely known, such as the attacks of sickness of children, vertigo and certain migraines; the prescription of correcting lenses then may lead to rapid amelioration or complete relief from the trouble. This is well seen in the cases described below :—

Summary :—Case of a boy suffering from severe periodic vomiting after meals unassociated with headache, and rarely with nausea; drowsiness, emaciation, and prostration marked. Cyclical vomiting is closely resembled. Complete relief by glasses, correcting slight compound hypermetropic astigmatism.

Frank C., aged 11, was brought to consult me, on the advice of Dr. Salt of Wingham, because for the past year he had suffered from repeated bouts of vomiting. These attacks occurred at intervals of ten days or a fortnight during school-term time only, and lasted over periods varying from two to fourteen days. Whilst these turns were on, emesis followed within a few minutes of the taking of any solid or liquid food by the mouth; occasionally, vomiting was delayed for an hour in the milder attacks. There has seldom been any nausea either before, or after the act, which is always very sudden; indeed, so uncontrollable is it, he has vomited twice at table and in the class-room. On other occasions, but more rarely, the food has been ejected or regurgitated almost as soon as it has been swallowed. Sleep has not been disturbed at night, for then there has been no sickness. Although the vomiting has been equally severe throughout, yet, as soon as a certain stage was reached, there was a rapid recovery—a common manner of termination was for the lad to retire to bed one night able to keep nothing down, and on the morning of the morrow to be well enough to take and retain a breakfast. In the

course of the school terms he has become emaciated and prostrate, but weight and health have always been restored by the holidays. Throughout these many attacks, drowsiness has been marked. Headache has not been complained of either before, during, or after the bouts. Dr. Salt, under whose care he had been for a short time, found no other evidence of organic disease, and, regarding the affection as of neuropathic origin, treated him by rest, careful dieting and sedatives. This being ineffective and recognizing the possibility of the mischief arising from an ocular defect, in spite of the absence of symptoms usually suggesting eye-strain, he advised an examination of the eyes. The last attack has just subsided.

Present condition:—A tall and intelligent boy for his years, but pallid, thin, and nervous. The odour of acetone cannot be detected, and his tongue is clean. R.V. and L.V. = 6/6, and J1 with +.75DSph. = 6/5. Good binocular vision. Ocular excursions and convergence full. Maddox rod reveals (for distance) exophoria corrected by 2D prism, and for near exophoria corrected by 5D prism. No hyperphoria or nystagmus. The pupils react briskly to light, accommodation, and consensually, and the fundi are healthy. After the use of atropine for a few days, the retinoscopy was $\frac{+1}{+1} \cdot 50$ in each eye, and $\frac{+.75DS}{+.25DCAV}$ was ordered for constant use

On April 8th, his mother reported "since wearing the glasses constantly, he has been back at school a month without any sickness; ordinarily, he would have had two attacks in this period." R.V. and L.V. = 6/5. At the end of July, there was a slight recurrence the day following a 15 miles' ride. The trouble recurred again in November, and lasted rather more than a fortnight. At this time the eyes were, by ophthalmoscopic and subjective examination, quite normal. On this occasion, Mr. S. H. Browning, bacteriologist to the Royal London Ophthalmic Hospital, investigated the urine for sugar, the acidosis bodies, albuminuria, and casts, as well as for Cammidge's pancreatic reaction, but found none of these present. There is little doubt that this attack was precipitated by nervous and physical fatigue, the result of bicycling to and from school, making ten miles daily. March 20th, 1915. His mother wrote, "there had been no trouble at all during the last three months until he broke his glasses. Whilst these were being repaired, I made the mistake of allowing him to go to school, and on the fourth and fifth days he was sick. Fortunately, the trouble subsided at once on taking to his glasses again."

Many years ago Weir Mitchell, Brudenell Carter, and Tweedy, drew attention to the importance of eye-strain in giving rise to symptoms resembling serious organic disease. Since then a great deal has been written, whilst recently Stephenson has collected together his articles and experiences in an admirable little book. The extensive bibliography that he quotes attests the interest of ophthalmic surgeons in this important subject during the past 15 years. The symptom-complex, with which we are more immediately concerned, is

that of migraine in its relation to eye-strain. In discussing this, and the nature of the case of Frank C., it will be necessary to mention other clinical cases and allied conditions.

MIGRAINE.

It is almost unnecessary to remark upon the difficulty of finding the correct treatment for any individual case of sick-headache, because so many sufferers go through life without relief. Now this affection is without doubt often excited by the summation of depressing effects arising out of several minor bodily disturbances, and the removal of one of these will often suffice to put a stop to this distressing trouble, or to mitigate it so as to make it easily borne. Although not all those afflicted with this malady suffer because of an uncorrected ocular defect, as some writers would have us believe, it is safe to say that many are entirely relieved, or have their lot rendered considerably happier, by attention to this particular depressant. This is well known to ophthalmic surgeons, but less so outside the limits of this particular branch of medicine.

Quite as important, however, is the recognition of the atypical class of migraine, which occurs frequently in adults, and is the rule with children. For this reason, it is probable that many distressing headaches or attacks of sickness, so common in childhood, remain unrecognized as migraine, which is, in reality, quite a common ailment before the age of adolescence. Hemianopsia and central scotoma, so unmistakably characteristic of this disorder, are often not complained of by adults, and only very rarely by children. So, too, with hemicrania, in the older patients it may be replaced by a bi-lateral headache (the two adult cases herein recorded); this is more often the case than not in younger patients. Other cases present the symptom of vomiting alone, and Stephenson, who has enjoyed so wide an experience amongst children, lays much stress on this symptom.

Vertigo, another of the very definite manifestations often presented during an attack of migraine, may be the only evidence in some people of this disturbance (Stephen Mackenzie, James Mackenzie). The giddiness in such an atypical migraine may occur so unexpectedly and suddenly, as to make the sufferer alarmed for her safety, or, being associated with

equally rapid sickness, afraid of misbehaving in public. In the case of Miss P., recorded below, these two symptoms were in the third generation the representatives of the ordinary migraine from which her father and grandmother suffered. On one occasion, when bathing in the open sea, this young lady was in a dangerous position owing to an attack. This trouble was remedied completely by attending to the ocular defects.

Without discussing fully the pathology of migraine, the sympathetic nervous system theory of Latham may be briefly mentioned. He supposes the tone of the body, together with that of the central nervous system, to be lowered by some departure from the normal, and thus its controlling power on the sympathetic system is lost or lessened. During an attack, the sympathetic nerves are in parts unduly excited—shown by the goose skin, the cold feet, etc.; in other parts, they are depressed. Many depressing causes are mentioned in the textbooks of medicine as excitants of sick-headaches—errors of diet, worry, undue excitement, over-work, fatigue, late hours, and numerous other factors, but practically nothing on the importance of an uncorrected ocular defect. If there be such, a constant depressant is always present, which is greatly aggravated by over-work, leading to what Ernest Clarke has termed “nerve waste.”

It is true that several sources of trouble may go to the production of a migrainous attack, and the correction of an ocular defect in an individual case may only lessen the frequency and severity, but this is an immense gain. On the other hand, there is no question that some cases of migraine, presenting quite well-marked ocular defects, are in no way helped by their correction, but, in spite of this, the eyes should be examined carefully as a routine procedure. As often as not these patients see well, but it cannot be reiterated too often that because a patient has full vision it by no means follows he has no ocular defect. It is the effort made by the ciliary or external muscles to overcome a defect that gives rise to the discomfort. Simeon Snell, Hewetson, Doyne, Mooney, Cobbledick, Kirkpatrick, and others, have published cases in which migraine was banished by attention to the eyes. Below are briefly described some cases illustrating a few of the points

mentioned.

Summary—A case of migraine in an adult presenting most of the typical text-book symptoms: very slight mixed astigmatism and presbyopia. Complete relief by glasses.

Dr. P., aged 52, was first affected with a typical migraine when a young man studying medicine. Shortly after commencing practice, the attacks lessened and disappeared. Until the past year or two there had been no trouble, but since then he has been much over-worked and the attacks have recurred, recently even as often as once a week. There is a sudden hemianopsia, followed in a short time by scintillating scotoma and diffuse headache. Up to the last few weeks these symptoms have been relieved, after a certain duration, by acetyl-salicylic acid. This is unsuccessful now that the attacks are longer and accompanied by sickness.

Present condition:—The typical tired look about the eyes—dull injection of the lid margins, scaliness of the lashes, and slight conjunctival irritation, that one associates almost pathognomonically with eye-strain. Muscular balance normal, and the eyes are healthy. Wearing + 1.50 D.sph.

for presbyopic correction. R. V. = 6/9 with $\frac{+25 \text{ D. S.}}{-50 \text{ D. Cyl. } 5^\circ \text{ out.}}$

= 6/5 with $\frac{+2 \text{ D. S.}}{+50 \text{ D. Cyl.}}$ = J. 1. L. V. = 6/9; with - 50 D.C. 10° in.

= 6/5 $\frac{+1.75 \text{ D. S.}}{+50 \text{ D. Cyl.}}$ = J. 1. Although it was not possible to lessen the

professional work, the trouble subsided at once upon wearing the above constant and presbyopic correction. Very occasionally hemianopsia has reappeared, but has passed off in a few minutes without treatment, and without the development of any other symptom. The significance of the disappearance of the migraine on giving up a student's life and its redevelopment at the age of the onset of presbyopia will be noted.

Summary.—Migraine in a young girl: hemicrania and sickness, but no optical sensations. Hypermetropic astigmatism. Correcting lenses lessened greatly the severity and the frequency of the headache, and entirely relieved the sickness and the nausea.

Daisy H., aged 15, has had attacks of pain radiating down the left side of the face and neck, associated with hemicrania and sickness, since the age of 11, when the menses commenced. Several hours before the actual attack occurs, she is made aware that she will be affected by a feeling of lassitude. Left-sided headache commences about noon, and increasing in severity culminates in the evening in vomiting. There are frequent bouts of sickness with much nausea until late at night, when she falls asleep. Complete recovery in the morning. There are no optical phenomena. The attacks have occurred once a fortnight or more frequently during the past six months.

Present condition:—Is pallid; no constipation; teeth sound, and menses

physiological. There is no heterophoria, and the eyes are healthy. R.V. $\frac{6}{12}$ and J. 1; with $\frac{+1.50 \text{ D.S.}}{+ .75 \text{ D.Cyl. } 55^\circ \text{ out.}} = \frac{6}{6}$ (3). L.V. $\frac{6}{12}$ and J. 1; with $\frac{+1.50 \text{ D.S.}}{+ .50 \text{ D.Cyl. } 40^\circ \text{ out.}} \frac{6}{9}$. The above correction, after confirmation under atropine, was ordered. A year later, she reported that the attacks had become infrequent, the headache being much less severe and unaccompanied by sickness.

Summary.—Case of migraine in young lady, in whom attacks are replaced by nausea and momentary giddiness, and slight sickness; entire absence of headache or other phenomena. Father and (paternal) grandmother affected by classical migraine. Myopic astigmatism and hyperphoria; complete relief by correcting these.

Miss P., aged 19, was referred to me on account of giddiness by Dr. Webb of Margate. Vertigo first appeared four years ago; it was momentary in duration, everything appearing to whirl around her. These attacks occurred at first about twice a year, but during the past few months once a fortnight. Since this increased frequency, the duration has been longer (now about three minutes), and there is slight sickness as well. The vertigo starts abruptly, and ends almost equally so, although slight nausea continues for about an hour, at the end of which she feels perfectly well. Whilst this temporary disability lasts, she leans up against anything handy, but being made to walk on one occasion two years ago she fell down. At no time has there been any tendency to fall in a particular direction—the surroundings have simply whirled around. Consciousness has never been lost, nor has there been any confusion of thought, and throughout she has been singularly free from headache. The father, who has always lived an up-country life on a ranche, suffered, until the past two years, from migraine. This, always made worse by the heavy work of “shearing time,” was characterized by hemianopsia, scintillating scotoma, hemi-crania, vertigo, great sickness, and in the worst attacks by “pins and needles” in the arm and leg and one side of the body. These symptoms passed in 24 hours, although the sense of well-being was not recovered for some days. His mother was similarly affected all her life.

Present condition:—She looks ideally healthy, and Dr. Webb was unable to find any departure from the normal to account for her symptoms. No evidence of petit mal; the hearing is full, and there is no tinnitus. Glasses for constant use were ordered by an ophthalmic surgeon in New Zealand. With own glasses, R.V. -3.5 D. sph. $= \frac{6}{9}$ pt. and J. 1; L.V. -5.0 D. sph. $= \frac{6}{9}$ pt., and J. 1. R.V. with $\frac{-5.5 \text{ D. Sph.}}{-0.50 \text{ D. Cyl. AV.}} = \frac{6}{5}$ and L.V. with $\frac{-4.0 \text{ D. Sph.}}{-0.50 \text{ D. Cyl. AV.}} = \frac{6}{5}$. With this correction, Maddox rod reveals a hyperphoria for near and far vision corrected by 3 D. prism, which makes binocular vision clearer and more comfortable. These results being

confirmed under atropine, a 1° prism, base up in one eye and base down in the other, combined with the spherocylindrical correction, was ordered. Since wearing these, there has been no recurrence of the trouble.

Diagnosis: common causes of giddiness are those arising from muscular imbalance, especially hyperphoria, and from insufficient convergence in myopia, and it will be noted that Miss P. had both hyperphoria and myopia. Under these circumstances, it may be asked why her giddiness is assumed to have been due to incomplete attacks of migraine. Vertigo due solely to an uncorrected ocular defect is not periodic, and occurs day after day if the eye-strain be sufficient. It is always made worse by close application of the eyes, is generally most marked at night and as a rule the symptom subsides during a holiday. Now this young girl's trouble partook of the nature of definite periodic attacks, occurring at any time in the day—during a day's golfing, once on awakening from sleep in the night, whilst walking—and unrelated to over-use of the eyes. Although vertigo was the symptom that occasioned the seeking of advice, the nausea was really the more prominent symptom, for it lasted for an hour. When the attack was over the trouble ceased completely, and she was in her normal rude health. This clinical picture differs entirely from one of being giddy and sick from an unrelieved ocular error. Finally, the family history is important, for migraine is often highly hereditary. This patient was relieved of her attacks by suitably correcting the myopia and hyperphoria; but this, in my opinion, does not invalidate this conclusion, for the reasons I have mentioned.

CYCLICAL VOMITING.

Referring now to cyclical vomiting, which, as I have already said, the case of Frank C. closely resembles. This periodic vomiting has been defined by Mercer as "a toxic neurosis characterized by uncontrollable vomiting, which is recurrent tending to cease or be replaced in adult life by migraine." Children between the ages of two and twelve are those usually affected, and girls more than boys. The sickness is usually severe, becoming in some cases almost constant, and accompanied by much retching. The attacks are said to be strictly periodic, but the intervals vary very much in the same individual. Vomiting is projectile and uncontrollable, interfering with, and interrupting sleep (Mercer). Drowsiness is very marked. Great prostration and loss of weight are characteristic, even although the vomiting is not severe, as in Mellanby's case. The attack ends, as a rule, by crisis.

Commonly, there is a definite acidosis, evidenced by the appearance of acetone, di-acetic acid, or beta-oxy-butyric acid in the urine. These products are, however, sometimes absent,

and Mellanby has proved them to be merely secondary, and to have no causal relation. Sedgwick and Mellanby, working independently, discovered that creatin was excreted in the urine of these patients, and that the amount rose rapidly just before and during an attack. As this substance was present as well in the interim in small amounts, they conclude that there is an abnormal metabolism of endogenous proteins.

Many suggestions have been put forward to explain the occurrence of attacks of periodic vomiting, but the sole point upon which authorities agree is that the children so affected have highly strung nervous systems. Adenoids have been assigned by Sedgwick, whilst others mention unusual excitement, shock, over-work, fatigue and errors of diet and of refraction (Mercer); in fact, just those depressing causes which are the excitants of migraine. Langmead and others mention that some of the patients develop an ordinary migraine at puberty in its stead. Mercer says, "from a neurotic view point recurrent vomiting seems to be related to migraine, and they may have a common cause," whilst Bellingham Smith suggests that this condition may be a manifestation in the child of sick-headache.

Mellanby and Twort have isolated from the intestine an organism, which by reaction with histidine produces beta-amin-azo-ethylamine. This substance has been proved to be highly toxic, and capable of causing similar symptoms. Howland and Richards think that shock and excitement, given an unstable nervous system, are sufficient to disturb metabolism and diminish oxidation, with the consequence that unoxidized poisons circulate in the blood and eventually pass the toleration point. Such a view would appear to bring into harmony the clinically observed (exciting) causes with the chemical facts.

The nervous vomiting, described by Bellingham Smith, has certain features in common with the case of Frank C., but it must be noted that Smith definitely excluded ocular defects and peripheral irritations as the cause in his cases. Briefly, certain children during the second dentition are subject to vomiting. It is a painless and effortless regurgitation of food occurring at or just after meals. It is not periodic, but, unless correctly treated, persists for many weeks. Vomiting

does not occur after all meals, for the child maintains its weight, is not prostrate, and keeps quite well. Boys are affected almost as frequently as girls. No demonstrable organic lesion has been found, and he attributes it to an irritability of the stomach comparable with the hyper-excitability of the bladder in enuresis. It is readily cured by small doses of arsenic and opium.

Put in tabular form, the symptoms of Frank C., according as they favour one or the other are—

NERVOUS,	CYCLICAL,	ATYPICAL MIGRAINE.
<i>Vomiting without retching only after meals.</i>	<i>Vomiting expulsive and uncontrollable.</i>	<i>Vomiting and no headache.</i>
<i>Sleep undisturbed.</i>	<i>Strictly periodic.</i>	<i>No acidosis.</i>
<i>No acidosis products in the urine.</i>	<i>Marked drowsiness.</i>	<i>Relief by correcting ocular defect.</i>
	<i>Emaciation and prostration.</i>	
	<i>Ends by crisis.</i>	

Langmead states that nervous vomiting may resemble mild cyclical vomiting, and Stephenson says, in atypical migraine in the child with severe sickness, the chief or only symptom may also be mistaken for that affection. Bearing in mind that cyclical vomiting may change at puberty into migraine, and that the exciting factors in each are similar, it would appear that the conditions are closely allied. The case of Frank C. very closely resembles cyclical vomiting in its general characters but for one important symptom—the sickness was only related to the taking of food, and in this respect it is like nervous vomiting. Had the absence of creatin been definitely confirmed, cyclical vomiting could have been excluded with certainty; but, even though this is not possible, the diagnosis is, on the whole, favourable to an atypical migraine, in which the only symptom was severe vomiting. Emaciation, prostration, and drowsiness would on this supposition be secondary to the prolonged sickness. A somewhat similar case has been briefly recorded in “Eye-strain in Everyday Practice.” In regard to the case of Miss P., it would have been difficult to come to a diagnosis of migraine on the strength of the symptoms of periodic attacks of nausea and the most transient giddiness, but for the very vivid history the father gave of his own migraine, and that of his mother.

To my mind, there is very little question, however, for the reasons mentioned under the diagnosis of this case.

An element of suggestion may come into the cure of these nervous cases, especially when immediate relief is obtained from correcting a very slight error of refraction. The fact that one successfully treats headache and discomfort by such correction in highly intelligent men and women, in whom there is no suspicion of neurosis, leaves, however, very little doubt. For instance, in the case of Frank C., the "nerve waste" was prevented, the tone of the body was brought up to par, and there was no further trouble. The very interesting experiment that this boy's mother unintentionally carried out, in which he continued at school after breaking his glasses, for four days without ill-effect, then becoming sick, but having immediate relief on recovering his glasses, points definitely in this direction. Headache, sickness, or other symptom in these ocular cases is merely the sign of continued loss of nervous energy, and any cure that results from wearing glasses is obtained by removing the excitant of this loss.

Another aspect, that these obscure cases of eye-strain present, is their liability to be mistaken for organic brain lesions; more especially if one or more symptoms of headache, sickness, giddiness, and nausea appear in the same patient with a fluffy indistinctness of the edge of the optic disc. This pseudo-optic neuritis, as it has been termed, is present in about 22 per cent. of children according to Stephenson and Bristow. I recall the case of a young woman, whose mastoid was explored on the supposition of intra-cranial mischief because of the association of intense headaches with what afterwards proved to be pseudo-optic neuritis. The cases I have recorded illustrate the importance of small errors of refraction, especially of slight astigmatism in setting up eye-strain: the value of .25 and .50 dioptries of cylindrical correction in many cases is now well proved. Finally as to latent squint or heterophoria; lateral deviations if slight seldom give rise to discomfort (the case of Frank C.), but upward or downward displacements (hyperphoria), even though small as in the case of Miss P., not unusually cause trouble and require correction.

I am indebted to Mr. George Coats for perusing this paper.

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NEURASTHENIA—ITS CAUSES AND
TREATMENT.

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THERE are many diseases which may be said to possess a specific treatment, that is to say, one accepted form of treatment which is universally regarded as being rational and satisfactory in the ordinary case. But, in dealing with a complex condition like neurasthenia, the very opposite may often be true; so many abnormalities present themselves that the physician is at a loss how and where to begin the treatment.

In neurasthenia, more perhaps than in any other pathological condition, the treatment has often to be symptomatic, at all events to begin with; but, as the more striking abnormalities are obliterated, and the blurring of the clinical picture, consequent upon the many apparently unconnected symptoms reduced more nearly to normal, the main plan of treatment to be pursued becomes plain. The object of this article is to suggest some methods of treatment, which are capable of doing this, and consequently rendering preliminary treatment efficacious.

It must be borne in mind that many neurasthenic patients are doubting and distrustful, and while not actually being wholly sceptical of cure, have more or less despaired of gaining benefit; the reason being that in many cases the disease is of long standing, and has up to the present resisted treatment, or else, has followed as the sequela of some long-standing and debilitating condition.

Now, in undertaking the treatment of any such case as this, the first effect to aim at is to gain the patient's confidence; in other words, to relieve some of the more urgent symptoms, and thus convince him that you are capable of curing the disease.

It is generally admitted that every case of neurasthenia

presents some psychic feature, and that these vary enormously in different cases. This has given rise to the division of neurasthenia into physical and psychical. Now, the various classifications of neurasthenia all tend to make the study so complex, that for our purpose it will be easier to consider the subject as divided into two heads—the cerebral and the spinal, according to which features are the more prominent. Whatever classification we adopt of the very complex disease, to which Beard more than fifty years ago gave the name of neurasthenia, it is plain that we are dealing with a disease which exercises the therapeutic skill of the physician to the uttermost. Neurasthenia, moreover, is becoming increasingly common every year, and it is no exception to say that half the patients who come for advice nowadays are suffering from some ailment consequent on functional derangement, and a large proportion of these are neurasthenics. For this reason alone, it behoves the medical man to have at his command a wide and varying treatment, so that he may be able to produce from his armamentarium remedies suitable for the various manifestations of the disease. In this way, he will save many of his patients months or even years of suffering, and rescue them from the many charlatans, who hover like birds of prey waiting to pounce on these unfortunate sufferers from “nerves,” and inflict upon them nostrums of unknown composition, with the promise that they will restore their “vitality.”

It is not possible, in the space at our disposal, to attempt any systematic or inclusive description of the various methods of treatment of this disease. We shall, therefore, briefly describe the symptoms and physical signs of neurasthenia, detail the more common causes, and deal at some length with the more successful methods of combating the preliminary symptoms, which are so often a stumbling-block in the early treatment.

Neurasthenia has been variously defined, and with as wide and varying a description as any disease. The reason for this is not far to seek, for there is no universally accepted pathology of the disease; one school regards it as of purely psychical origin, while the other insists on its physical basis. All functional nervous diseases must be regarded as

being derangements of the physico-psychical apparatus, and there is no neurasthenic disturbance which is not a combination of deranged symptoms of both mental and bodily origin. Neurasthenia always exhibits features, which leave no room for doubt that it, like hysteria, is a physico-psychical disease, and its treatment must be based on a clear understanding of this fact.

For our purpose, therefore, we shall regard the disease as one of "irritable weakness" of the whole system, characterized by mental symptoms, chief among which are extreme nervousness, dislike of meeting strangers, many phobias, instances of which are claustrophobia, agarophobia, siderodromophobia, batophobia, etc.; mental exhaustion, intellectual weakness (but not necessarily impaired will-power), inability to bring to a successful conclusion any task, however easy, depression, often of a melancholic nature, and undue sensitiveness of the sensorium; physical symptoms, such as bodily weakness, headache (parietal in localization and frequently "skull-cap" in character), dyspepsia (atonic), constipation (characterized by "sheep-dung" motions, due in all probability to the abnormally long time in which the fæces remain in the colon) anæsthesiæ, dysæsthesiæ, and areas of hyperæsthesiæ. Added to these, on examination, alterations in the reflexes are frequently present, such as an exaggerated or diminished knee-jerk, and a sluggish pupil, often accompanied by vague pains, transitory and fleeting in character. A class of symptoms is frequently observed, which may be caused by alterations in the vaso-motor apparatus, examples of which are abnormal and frequent attacks of blushing, cold hands and feet, and sundry others, more or less directly referable to the circulatory system.

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The diseases which are most often seen complicating neurasthenia or else simulating the condition, are the other two great functional disorders, hysteria and hypochondriasis. Before discussing these conditions, it may be as well to emphasize the fact that, while these conditions represent completely different diseases, they are not infrequently seen in the same patient, thus complicating the diagnosis.

While neurasthenia may be regarded as a condition o

"irritable weakness," in which the whole nervous system is exhausted, *i.e.*, is in a state of diminished origination and conductivity of nerve impulses, hysteria is a state of perverted nerve impulses, in which, far from there being a diminution of nerve impulses, there is an increase of origination though a faulty distribution. The same may be said of hypochondriasis, namely, that while it frequently co-exists in a neurasthenic, it is a diseased condition, *per se*, and is characterized by an extreme and ever-present introspection, which forces the patient to spend his life searching for a cure for an imaginary ailment. Neurasthenics are not infrequently introspective, and this makes the condition resemble hypochondriasis, although, with one other exception, there is little in common between the two diseases. This other condition is the dyspepsia which is fairly constant in hypochondriacs, and, as will be seen later, is a characteristic feature of neurasthenia.

Hysteria is a completely different condition, and in an uncomplicated case presents a clinical picture which cannot be mistaken for neurasthenia. In both conditions is seen a disease due to functional nervous disorder, presenting different features, both as to the type and age of the patient, and the nature of the symptoms and signs. This is best shown in tabular form.

NEURASTHENIA.

Age.—Any age, the third and fourth decade being commonest.

Sex.—Both sexes, the males being more affected than the females.

Main features.—Both physical and mental symptoms, among the former being characteristic headache, constipation (sheep-dung motions), atonic dyspepsia, extreme languor and sometimes weakness, tremors of limbs, various sensory disturbances such as *irregular* patches of anæsthesiæ, and vaso-motor symptoms. Among the mental symptoms may be mentioned the outlook, described by Beard as "*tædium Vitæ*," intellectual weakness, deficient memory,

HYSTERIA.

Age.—Mostly seen in young women or in women at the climacteric.

Sex.—Almost exclusively women.

Main features.—The disease consists of periodical attacks, during which all control may be lost, and the patient may appear to become suddenly maniacal, or to be in the throes of an epileptic fit. In hysteria, the complete absence of the will-power is always a marked feature, but during the seizures this is observed in an acute form, the patient throws herself about, and develops signs which resemble in a remarkable way those characteristic of organic

NEURASTHENIA.

many phobias, depression, and general mental exhaustion.

Progress.—Improvement under treatment, but is often extremely slow to yield to therapeutic methods.

HYSTERIA.

nerve lesion. Seldom any marked physical symptom, although anæsthesia of a regular type is common, *e.g.*, hemi-anæsthesia, paranaesthesia.

Progress.—The attacks can be aborted by strong stimulation of nerves, such as supra-orbital pressure, the faradic current, cold water douche, etc. Much can be done to alleviate the condition, and time often erases the disease, but it cannot be said to be definitely curable.

It will be admitted that it is highly probable, both from the age at which hysteria is mostly seen, as well as from the evidence of the disease, that vaso-motor aberrations are at the root of the trouble. The name which the Greeks gave to the condition proves that they regarded it as being due to changes in the womb (*ὑστερος*—the womb), these changes having deleterious effects on the blood supply of the body. As many of the manifestations of the disease resemble in a remarkable manner those seen in organic nerve lesion, *e.g.*, embolus of the middle cerebral, it seems highly probable that the symptoms are produced by some alteration in the blood supply of the cerebro-spinal tract, such as a local fall of blood-pressure, or a sudden flushing of the cortex with blood. Now, this condition would be most likely to happen at the times when the whole vaso-motor system is in a condition of upheaval, namely, at puberty and at the menopause, and it is at these times that hysterical phenomena are most marked. It is for parallel reasons that neurasthenia might very well be caused by some such conditions, although we shall have to look elsewhere for the causation. Not that this would be difficult to supply, for we have several theories to account for the manifestations of this condition.

Almost every case of neurasthenia presents some features pointing to auto-intoxication, due to pyorrhœa alveolaris, fermentative dyspepsia, or intestinal putrefaction; and it would not be a far step to assume that this intoxication

affects the central nervous system in a deleterious way. We know how many poisons show a selective action (*e.g.*, lead, tetanus, etc.), and even in a more limited way than we are assuming to happen in neurasthenia. Whatever theory as to the causation of this condition we adopt, it is obvious that the actual condition is one of malnutrition or insufficient nutrition of the cerebro-spinal and sympathetic systems, as shown by the many abnormal symptoms which can only logically be referable to the centres or their nerves which govern the circulation.

Before passing on to the consideration of the treatment of this condition, we may, perhaps, be allowed to refer to another theory which deals with the relation of the mind and sympathetic nervous system in this connection. This theory maintains that the part of the mental apparatus, which the late Mr. F. W. Myers called the "subconscious mind," is so linked up with the sympathetic system that it constitutes a subsidiary nervous controlling agent; that this agent comes into force when the conscious mind is passive, *i.e.*, during sleep, and that it is this dual combination which can be appealed to by suggestion. This point is interesting in studying neurasthenia, because we know that the sympathetic system is concerned, *inter alia*, with the control of the local and general blood-supply of the body, and that the most marked and constant features of the disease under consideration are the disturbances of these very functions, and that therefore we shall not be very rash in assuming that these two facts bear in some way on the pathology of this most intricate condition.

If we consider the disease from this point of view, namely, that it is essentially a disease of the sympathetic as well as the cerebro-spinal system, we shall find that all the variegated symptoms will be accounted for by functional disturbance of these two important systems.

GENERAL TREATMENT.

In approaching the treatment of neurasthenia, one fact must clearly be borne in mind, namely, that to achieve any degree of success we must rely on no one method, but by the multiplicity of our resources be enabled to attack the morbid condition

from many standpoints. We are faced with a condition of general weakness, accompanied by several highly characteristic symptoms, two or three of which, as a rule, call for separate consideration, while some of the others disappear *pari passu* with the improvement in the general condition. But each case varies in its presentation of predominant features, and it is therefore necessary to be guided by each individual case as to which form of treatment should primarily be adopted. It may be argued that to relieve a symptom without attacking the cause is irrational ; but it must be remembered that, in this particular disease, the symptoms form part of a vicious circle, and by their constant presence serve to emphasize the general state of ill-health in which the patient is, which in turn results in increase of the mental abnormalities. Therefore, we are quite justified in immediately attempting to alleviate the more prominent symptoms, until such time as the general condition can be dealt with. As it is impossible in an article of this length to deal in detail with the treatment of neurasthenia, we shall confine our remarks to certain methods of treatment, which have been particularly successful.

Of the many therapeutic methods which are of service in treating neurasthenia, none is of more service than systematic *régime* in meeting the various mental and bodily phenomena which characterize this disease. Nothing is more harmful to the patient's outlook than a slipshod mode of life, and the perpetual procrastinations and vacillations, which form part of the mental sluggishness, too often result in failure of any treatment, when not accompanied by routine measures. The sufferer from this disease feels everything in life to be a burden, and is at a loss when faced with any task which he has undertaken.

It must not be assumed from this that he is never able to rise to a sudden emergency, for this is far from being the case ; but the stimulus has to be sufficient (such as a necessary appearance in the witness box) to arouse his jaded faculties from their lethargy. Furthermore, just as rest is required to enable the physical frame to recoup, so does the mind require a freedom from all responsibilities to enable it again to undertake the ordinary duties of life.

The advantages to be gained by adopting a routine method

of treatment are many, not least among them being the discipline associated with a nursing home or similar institution, and the regularity of the mode of life in which all arrangements are made for the patient, who is consequently free from all troublesome anticipations and the worries associated with home life, even in the easiest circumstances. Added to this advantage, is the ease with which the various therapeutic remedies can be carried out, when the patient's whole time is given up to treatment, the regularity with which the meals and medicines can be administered, and the generally beneficial results which follow a normal amount of rest and sleep. For these reasons alone, then, where possible, a course of treatment in a nursing home or similar institution should be advised, for this undoubtedly paves the way for the more successful administration of active remedial agents.

It must be remembered that in dealing with a case of neurasthenia, both the mind and body have to be taken into consideration, and that even points which may appear trivial will need due and careful consideration, if success is to be achieved. Therefore, even such points as the arrangement of the patient's room are of importance, for a bright sunny room and cheerful surroundings are a great stimulus to the jaded and depressed mind so commonly seen in this disease. Once the confidence of the patient has been gained, and it has been made clear to him that his ailment, while definite, is not hopelessly incurable, the first step has been taken towards recovery. On the other hand, if he receives the impression that the doctor merely regards him as a "*malade imaginaire*," and that while outwardly sympathizing he is inwardly believing his symptoms to be non-existent, it will do much to hamper his recovery.

In short, when once the diagnosis of neurasthenia has been arrived at, systematic and thorough treatment of general and local symptoms offers the best, if not the only, hope of complete restoration to health.

Dietary.—In the large majority of cases of neurasthenia, dyspeptic troubles are a marked feature, and until these have been rectified, little can be done towards treating the general condition. Therefore, the dietetic treatment of this condition is of the first importance, whether gastric disturbance is present

or not. In those cases in which there are no digestive troubles, we still have to consider the factor of malnutrition, and to endeavour to obtain a maximum of food-assimilation with a minimum of effort on the part of the digestive apparatus. In accomplishing this end, a carefully thought-out system of diet is essential, and all food-stuffs which are badly tolerated must be eliminated from the dietary.

We must bear in mind that the muscular coats of both stomach and intestine are in all probability atonic, that the nervous stimulation to the glands is defective, and the gastric juices are in consequence reduced in amount. For this reason, we must advise that all food should be given in an easily assimilable form, and never in a large bulk at a time. Dry meals must be insisted upon, for the dilution of the digestive juices by drinking with meals does much to retard digestion. The particular form of nourishment which is most suitable is that which contains the largest proportion of flesh-forming elements, namely, the proteid group, particularly, meat, eggs, and fish. All these are rich in phosphorus and the phosphates, and supply, therefore, the most suitable form of nourishment for all cases in which the central nervous system is at fault. Again, when the stomach is incapable of supporting the bulk of a heavy meal (as in its atonic condition it tends to sag down), it is unable to pass the food through the pylorus, with the result that the patient complains of distension after food due to gastric fermentation.

The meals, therefore, in these cases should be at more frequent intervals than is usual, light in character, composed of those food stuffs which are most easily dealt with, and accompanied, if necessary, by accessory digestive ferments. The neurasthenic is not only better able to deal with meat foods than with carbohydrates, but he derives more benefit from these; consequently, only easily-digested starchy foods should be permitted, and the greatest reliance placed upon the proteid group.

Some such diet as the following will be found suitable in most cases of neurasthenia :—

On waking.—A tumblerful of hot water should be drunk.

Breakfast.—This meal should be substantial but not heavy. An egg, boiled fresh fish, or a lightly grilled chop, followed

by toast and butter (the latter limited in amount and only in suitable cases).

11.30 a.m.—A glass of hot beef-tea, mutton broth, or simply hot water.

Luncheon.—Luncheon should consist of a grilled chop, freed from fat, or steak cooked by the Salisbury method, and accompanied by any green vegetable, cooked in its own juice and served dry. A small milk pudding should follow this course in suitable cases.

4.30.—A cup of China tea, served without milk.

7.30 p.m.—This meal should resemble the mid-day meal, but should be varied according to what has been partaken of at that meal. If the patient has had a chop, fish should be consumed, but on no account should fluid, even soup, be allowed. Chicken, or a slice from the fresh joint may take the place of fish.

10.30 p.m.—A glass of hot milk, or a cup of arrowroot or ovaltine.

With such dietary as the above, it is possible to administer a large quantity of nourishment, without in any way embarrassing the stomach or intestines. It goes without saying that many modifications will be needed in different cases, but these can easily be initiated without upsetting the general plan. As far as possible, all fluids required by the body should be administered between meals, partly because any quantity of fluid taken with meals dilutes the gastric juice, and partly because liquids drunk between meals serve to wash out any particles of food which may remain behind from the previous meal, and irritate the gastric mucosa.

Alcohol in any form is undesirable in neurasthenia.

The following articles of diet are best avoided :—Potatoes, made-up dishes, stews, rich puddings, such as suet, pastry, and currant puddings, sugar, sweets, chocolate, many fruits, e.g., gooseberries, strawberries, raspberries, and some vegetables, as parsnips, turnips, and indeed most root vegetables. In all cases sauces and gravies are undesirable, and the food should be served dry, and thoroughly masticated. A careful watch should always be kept upon the digestive apparatus, and the amount of urea excreted should be noted from time to time.

Rest and Exercise.—The next consideration is, how much exercise should be prescribed for the neurasthenic, and what proportion of the day should be devoted to rest. Again it is impossible to generalize, for each case calls for its particular

directions, and no description of a suitable *régime* of exercise and rest will apply to all patients.

With regard to rest, by far the most important point to consider is, that when rest is taken it should be a complete rest in which both mind and body partake. In most cases, a definite portion of each day should be devoted to what may well be termed "organized rest." The patient is made to lie down, relax the limbs, breathe deeply, and close the eyes. The most suitable time is after meals, when digestion is in progress.

With regard to an analogous relaxation of the mind, it will readily be admitted that this is a much more difficult state to produce, unless some method be adopted by which worrying and mental thoughts can be replaced by a less active panorama. One method is to advise patients when resting to direct their attention consciously to muscular relaxation, to count their respirations, to relax in every way any "tension" which exists, and to give themselves up to rest.

Although these processes do not constitute complete mental rest, the work entailed is but a trifle compared to what the mind of the neurasthenic is usually called upon to perform when resting.

The Italian physiologist, Mosso, has shown that certain chemical products are present in the blood as the result of fatigue, and that when he injected the blood of tired animals into a fresh animal, a typical condition of fatigue was produced. Furthermore, he has demonstrated that these products are not present in the blood after the animal has rested, showing that they are produced by activity, that they circulate in the blood, and apparently exert some action on the nervous system, with the result that fatigue is produced, and remains until the organism has rested. Under some stimulus of considerable power, the latent reserve of strength which is present in all of us, can be called upon and further effort made, although an ordinary stimulus is insufficient to produce this. Now, this factor is very like the condition of things which we find in neurasthenia, namely, that although the individual is fatigued, additional stimulus results in a transient outburst of fresh energy. We need only carry the simile a little further, and assume that as much change takes place in the fatigued muscle of the

neurasthenic as occurs in the muscles of a tired person, and we must assume that a thorough rest will bring the organism more nearly to normal. The "nerve-rests," as outlined, are often instrumental in bringing about this condition.

ELECTRICAL TREATMENT.

At the present time, electricity is being used so widely and with such distinct success in many cases, that no account of the treatment of neurasthenia would be complete without some mention of it. On the other hand, in an article such as this, it is obviously impossible to deal at all thoroughly with the subject, so I am forced to limit my remarks to the more usual methods of treatment, and describe in a general manner their effects on the patient. The subject may well be divided into two headings, namely, the direct effect of electricity upon the cerebro-spinal system, and its indirect effect on the functions and nutrition of the body.

Direct Effect of Electricity.—It is only in recent years that this action has been demonstrated at all definitely, and not until the researches of Hitzig and Fritsch in 1870 can it be said that much was known as to this branch of the subject. Much controversy had arisen as to whether its direct application was safe, or whether electricity had any effect on the central nervous system, one school declaring it was absolutely unsafe, while the other maintained that it could not produce any effect through the skin and bone which surrounds the brain and spinal cord. Erb maintained that electricity would be of great value in the treatment of derangements of the brain and other parts, and prophesied, from experiments he had conducted on the cadaver, "that the possibility of a direct effect on the brain and upon its parts being admitted, it is quite legitimate to suppose that these effects will not fail in the brain, even in the case of certain diseases, and then it may be anticipated that in all probability electric currents . . . will make the conditions of circulation and the course of the nutritive fluids easier . . . that they will improve the nutrition of the parts, and they will eliminate, or at least lessen, the conditions of chronic inflammation, sclerosis, degeneration, and others of the same

kind."

Since that time, other experiments have been carried out, and the direct action of the electrical current demonstrated, the effect on animals being described in the words of Leduc . . . "When a small cathode has been placed on the forehead of a healthy animal, an anode over the loins, and the intermittent current described is gradually established at a certain intensity, all the functions of the nerve centres are found to be suspended, with the exception of those which govern respiration and circulation. The animal makes no more spontaneous movements, it responds to no stimulus, it shows no more sensibility, and all sorts of operations can be performed upon it; it is in the condition of an anæsthetized animal . . . This is the condition I have described under the name of "electrical sleep."

Many other and differing phenomena are able to be produced at will by variations in the intensity of the current, but, as we are not concerned with this aspect, we will pass on to the consideration of the practical applicability of direct electricity in the treatment of neurasthenia.

For the practical application of this current, a source of continuous supply is necessary, and similar electrodes to those already described, must be made use of. They can be attached to the two poles of the battery (or circuit as the case may be), and a continuous current not exceeding five milliamperes allowed to pass for a few minutes. When applied to the head, in this way, much relief follows in many patients, and headache is frequently banished. Care should be taken that no break occurs in the current, for unpleasant feelings of giddiness, or even syncopal attacks may follow the breaking of the current. When this method is applied to the body, a zinc pad covered with flannel and moistened with hot salt solution is utilized for the negative pole, a charcoal plug or similar non-active substance being used for the positive pole. In applications to the head, the pads forming the electrodes should be of large size so as to distribute the current over as wide an area as possible, and they should be firmly bandaged with several turns of roller bandage, and a rheostat introduced into the circuit so as to allow of the gradual increase of the current.

As a result of this, marked improvement is often produced in the power of concentration, and mental stupor and sluggishness is to a large degree abolished. The substitution of a 2 per cent. solution of sodium salicylate for the salt solution at the negative pole, is a sure means of improving the neurasthenic headache, if this symptom is a particularly prominent one. The salicyl-ion is introduced by cataphoresis into the skin of the forehead (the negative pole being situated at this place), in many cases with a happy result.

Indirect effects of Electricity.—Under this heading we shall consider briefly the following methods :—

- a. Electro-static douches and baths.
- b. (1) General faradization.
(2) General rhythmic faradization.
- c. Peripheral nerve-stimulation by electro-static, machine, etc.

a. *Electro-static douches and baths.*—Very little is known for certain about the exact changes which occur as the result of electro-static baths and douches, but it is generally admitted that they increase oxidation, and stimulate the excretion of urea, adding materially to the metabolic interchanges of the whole system.

For this treatment, the patient is insulated on a stool with glass legs, which is connected to one pole of an electro-static machine, and he is placed in contact with the other pole, which is utilized for the bath, the air completing the circuit. When the machine is started the potential is rapidly raised, so that the patient is soon at the same electrical potential as the pole to which he is connected. In the case of the douche, this pole is joined up to an instrument composed of several points made of some material of low power of conductivity, such as hard polished wood, so that the too rapid discharge of current is prevented, and this instrument is fixed so as to rest above the patient's head. The result of this treatment is by no means disagreeable or painful, but is quite pleasant and gives the sensation of some light clothing resting on the skin. The patient can be connected up to either the positive or the negative pole, but when the douche is used the concentration of the electricity at the crown of the head

is much more marked than when the bath is used alone.

The effect of the combined bath and douche is an ionization of the air, causing a strong smell of ozone to permeate the atmosphere, and producing violet rays at the pole of the douche. The patient is, in fact, between a double current of ions, those proceeding from the positive pole to the negative, and those passing in the opposite direction. Each treatment should last about fifteen minutes.

b. (1) General faradization.—This method, which Beard considered to be particularly successful in the treatment of the neurasthenic condition, consists of the application of the induced current to the whole bodily surface. The method of application is as follows:—The positive electrode is made from several thicknesses of wool or similar material which covers a metal plate, and this in turn is connected to one pole of a source of faradic current. The electrode attached to the negative pole, consists of a block of charcoal, also covered. Both electrodes are moistened in a hot solution of common salt of 1 per cent. strength. The positive electrode is passed over the skin and surface of the body generally, in fact, a sort of massage is used, while the negative pole is fixed by a bandage to the epigastrium or loins. The current should be just strong enough to produce slight contractions, but not strong enough to produce feelings of shock or pain. The sitting should last about fifteen minutes. The main difference between the effects produced by the continuous and the interrupted currents, is that the former produces electrolytic action, while the latter produces muscular excitation and contraction.

b. (2) Treatment by general rhythmic stimulation.—A method which has only recently come into general use, and has proved of such distinct service in the treatment of neurasthenia, that a short account of it will not be out of place here. The method is associated with the name of Prof. Bergonie, and although many modifications have been devised since his original apparatus, the main lines remain the same. The principle consists in applying to the general bodily surface an interrupted current, which can deliver stimuli at a given rate to the entire bodily service. In point of fact, the value of this method of treatment cannot be exaggerated in cases of neurasthenia, for it has cured patients whom all other treatment

had failed to benefit.

In a previous article,¹ the writer dealt with the details of the apparatus, the method of administering the treatment, and the diseases in which good results had been obtained. A brief account of the treatment, and its application to neurasthenia may be permissible at this point. The patient is seated in a semi-recumbent position on a chair fitted with ten pairs of electrodes made of aluminium, and connected with the source of supply of the current by cords to a switchboard. These electrodes are covered with suitably shaped flannel pads, previously wrung out in hot water, and applied to the various parts of the body. A metronome is fitted in the circuit, by which the rate of interruptions is regulated. Ten pairs of rheostats and a large compound control are fitted, by which the amount of the current can be controlled to each electrode and the total amount regulated. The object of this treatment is to obtain regular and rhythmic muscular contractions. When the metronome is set at the rate of the pulse, the contractions assist the *vis a tergo*, and aid the cardiovascular system in circulating the blood around the body. The diaphragm partakes in the stimulation as well as the stomach and intestines.

As the circulation is faulty in nearly every case of neurasthenia, it will readily be understood how beneficial any method will be which will remedy this; in fact, it would be no exaggeration to say that in many cases once the circulation improves, the general bodily health rapidly returns. This method has the additional advantage that it gives exercise without fatigue, stimulation without reaction, and a healthy circulation to those who have no other means of obtaining this. In neurasthenia, especially that variety which has been designated by some writers "spinal," *i.e.*, made up of purely physical symptoms, the writer has had the most gratifying results, the patients rapidly returning to normal health, and in many cases feeling more alive than they had for years previously. This success has prompted a rather fuller account than space would otherwise have permitted.

c. Treatment by stimulation of peripheral nerves.—This can be accomplished in many ways, chief among which are the elec-

¹ THE PRACTITIONER, June, 1914, "Treatment by General Rhythmic Faradization."

tro-static machines, Leyden jars, and friction. The stimulation is obtained by some method of sparking, and is often a valuable aid in neurasthenia to overcome the inertia and sluggishness. In using this method, the patient is placed upon an insulated stool, and connected with one of the poles of the instrument, while the other pole is connected by a metal chain with an electrode, consisting of a metal ball, the position of which can be varied by means of an insulated handle. When this sphere is brought near the skin of a patient, spark-discharges ensue producing stimulation of the patient's peripheral nervous system. The frequency of these varies with their length and the size of the machine.

Electrical friction can be employed in conjunction with this, by means of a metal ball rubbed over the bare skin, or over a loosely-fitting flannel jacket.

The application of this form of electrical stimulation is of undoubted value; it should be administered twice or three times a week, and the sittings should not exceed 20 minutes at the outside.

In conclusion, it may not be out of place to quote four cases, taken at random from my case-book, which illustrate simple neurasthenia, neurasthenia associated with hypochondriasis, hysteria and neurasthenia, and neurasthenia combined with an organic nerve disease, in this case disseminated sclerosis.

CASE I.—*Simple Neurasthenia*.—A. L., a woman of 46, consulted me for the following symptoms, which she related to me very much in the order in which I quote them, and without requiring much questioning on my part. For the few months previous to this, she had been worried by what she described as "muzzy feelings" in her head, and her power of concentration had become defective, so that she was unable to think out her day's plans clearly. In addition to this, she had suffered with a perpetual headache, which was parietal, and occasionally occipital in distribution. On being asked to describe it in more detail, she stated that it was worse on the crown of the head, and felt as if "there was something wrong in her brain." Her legs had felt weak of late, and she had become very easily tired. She felt some anxiety as to her future, declaring that she dreaded and feared insanity. No phobias were present, and she was quite rational and sane in her behaviour. She complained of constipation, and pain after food, but regarded these as of minor importance, and quite secondary to the abnormal state of her head.

On examination, no signs indicating organic disease were discoverable, and, except for a slight exaggeration of the knee-jerks, no abnormalities

were found. There was, however, some slight limb tremor, and the pupils were somewhat mydriatic, and slow to react, and required a strong light to cause contraction. This patient improved greatly on valerian and bromide, and when symptomatic treatment had been undertaken for the constipation and headache, she made a rapid recovery.

Note.—The interesting features of this case were, firstly, no direct cause was ascertainable; secondly, she related her symptoms in a most concise way, and these were the typical symptoms of neurasthenia, but there was apparently no exaggeration of pain and no introspection; thirdly, there was the great fear of impending insanity, which is so common in neurasthenia.

CASE 2.—*Neurasthenia associated with Hypochondriasis.*—F. B., aged 32, had for the last fourteen years suffered with various organic diseases, which had required considerable medical and surgical treatment; in fact, he had, on and off, all those years, required treatment for some definite organic trouble. His first illness had been an attack of renal colic, for which he had been X-rayed, had undergone a cystopic examination, taken many medicines, of all kinds, and visited many watering-places. He had subsequently passed a stone *per urethram*, and, following that, had suffered from gravel and vesical irritability. As these symptoms still remained, he had undergone further treatment, into the details of which we need not enter here. The kidney trouble had continued on and off for some subsequent years, and, in addition to this, he had suffered from some intestinal lesion the nature of which was not very clear. He attributed this illness to an alkaline mixture which a doctor he had consulted had prescribed for his renal trouble. In search of further cure for these ailments, he had drifted from orthodox to unorthodox, from physicians to herbalists, and had consulted so-called "healers" for mental and spiritual treatment. He was a great student of medical works, and was thoroughly up-to-date in all medical treatment, particularly those methods applicable for his own personal ailments. His knowledge of the Pharmacopœia was considerable, and his comparison of the various systems of medicines able and comprehensive. It will be seen from this that he had developed marked and intractable hypochondriasis, associated with a definite neurasthenia based upon his organic lesions, which, at the time he consulted me, were in abeyance, and had shown no sign, to the trained eye, that gave the slightest hint of being actively present. But, although in themselves absent, they had left behind signs that showed in a marked manner that the ravages on his nervous system had been considerable.

At the time he consulted me, he had been under treatment of one kind or another for the last fourteen years, and he informed me that "any drugs which suited his kidney upset his intestinal condition, and that one doctor who had prescribed bismuth had not been aware, until he had told him, that bismuth was excreted as a salt which caused irritation of the kidney"! His principal symptoms were, headache, strange noises and buzzing in the ears, weakness and hypersensitiveness of his body, especially over the skin between the umbilicus and the xiphisternum, many mental abnormalities, e.g., agoraphobia, claustrophobia and hypsophobia; "precision" (which I have never seen in a more exaggerated form), obscene thoughts which he tried in vain to control, and ever-present introspection. Further, he had

obstinate constipation, and signs pointing to gastric atony and gastrectasis. There were very few abnormal physical signs discovered on examination, with the exception of areas of hyperæsthesia, and those already mentioned as present in the stomach, such as gurgling and splashing and signs of intestinal stasis. Vaso-motor phenomena were marked, sweating being caused by the slightest provocation, and even by such peripheral stimulation as a sudden noise or light. The reflexes were not markedly exaggerated, and there were no limb-tremors. He had only been in the habit of eating predigested foods, and a few sundry and ill-assorted articles which he found "agreed with him." It will be tedious to recount this case at greater length, suffice it to say that the symptoms, which were purely neurasthenic in origin, to a large extent disappeared, but the hypochondriasis, of course, still remained. He was convinced that he was no better, although the constipation, indigestion, and many of the mental symptoms had disappeared, and his general health had much improved.

The treatment adopted in this case consisted of central galvanization for the general asthenia, associated with suitable symptomatic measures to combat the constipation, etc. All drugs which were used, with the exception of purified paraffin, which was most helpful in this case, had to be administered by hypodermic injection, or else *per rectum*, for the patient declared his utter inability to take any medicine by the mouth as "it was sure to upset his intestinal mucous membrane." Suggestion was also used in this case to attempt to overcome the morbid mental processes, but, although some good was accomplished in this direction, it was not strikingly successful.

Note.—In this connection it is interesting to observe:—(1) that the neurasthenia and hypochondriasis originated in prolonged bodily illness, and, therefore, there was a definite cause to which to attribute it. (2) That hypochondriasis is most resistant to treatment, if not actually incurable. (3) That whether an article of food is digestible or not depends more on mental processes than will generally be admitted; for any article of diet which this patient did not himself approve of, not only was said by him to cause indigestion, but in some cases seemed to do so, although in itself the most bland and nutritious of food.

CASE 3.—*Neurasthenia associated with Hysteria.*—K. H., a single woman, first came under my care for an hysterical seizure. She presented the typical signs of hysteria, and undoubtedly was also the victim of neurasthenia. Apart from minor ailments of a trivial nature, she had always been healthy, but had from her childhood been highly-strung and excitable. She complained at this time of "strange feelings in her head," a dread of the future, a horror of the past, and a dislike of the present. At the time when I first saw her, she was in a seizure of uncontrollable emotion, had frequently threatened suicide, although she had never attempted it, and spent most of the day in fits of weeping. When the attack had passed, she was quite rational in her behaviour, and, although a small stimulus was sufficient to provoke another attack, was intelligent in her conversation, but unable to arouse interest in anything. There was an element of sexual excitability, and there had been some love disappointment in the past, which, associated with financial troubles, had brought about her condition. Her general symptoms were a medley of hysterical and neurasthenic phenomena, and

consisted of obstinate constipation, intractable headache, weakness of muscles, and various pains quite irregular in localization. She possessed no phobias which were ascertainable, and between the attacks was normal in her mental attitude. During the attack, she became so irrational that an alienist, whom she saw previous to my first visit, recommended certification.

With regard to her physical signs, the most marked were, furred tongue and offensive breath, large pupils slow to react, functional tremor, but no limb wasting, or loss of muscular tone.

Complete recovery followed suitable treatment, which consisted in isolation in a home with complete freedom from the visits of her relatives, and careful symptomatic treatment. Her general condition was amenable to sedatives and complete rest, with tactful management.

A considerable time has elapsed since she recovered, but with the exception of one relapse, which was quickly amenable to treatment, she has remained well, doing her work and enjoying life.

Note.—This case shows how valuable isolation treatment may be in these patients. The rapid improvement in the mental condition which followed the partial Weir-Mitchell, and the gradual improvement in symptoms which resulted from careful symptomatic treatment, were most gratifying.

CASE 4.—*Neurasthenia associated with Disseminated Sclerosis.*—A. A., a man 57 years old, had been suffering from “nerves” for some 18 months previous to my first acquaintance with him, which had showed themselves in utter inability to concentrate, fears of various natures, vaso-motor symptoms, and insomnia. During the few months previous to this he had had financial worries, had eaten insufficient food at irregular intervals, and had been in an employment which was uncongenial to him, and which was associated with much worry. On being questioned as to past illnesses he admitted having contracted venereal disease about 30 years previously, for which he had undergone suitable treatment. He had also had operations for appendicitis and hernia, but with these exceptions had not had any serious illnesses.

On examination, marked tremor was noticeable, which was distinctly worse on attempting to perform any definite act; lateral nystagmus was also evident, while the knee-jerks were exaggerated and sometimes multiple. There was no wasting, the patient was well nourished, and his general musculature was good. No changes were present in his optic discs, and there was no alteration in his speech. His gait was normal, and although he complained of great weakness in his legs, examination showed no greatly deficient power.

His principal phobia was claustrophobia, although at times he suffered with misanthrophobia. These symptoms varied greatly, but he had never become sufficiently normal to meet strangers, or to attend to business matters; and, should he be asked to attend at a certain place to meet someone who was likely to offer him employment, it caused him sleepless nights beforehand and completely upset him, rendering him unable to eat his meals or to remain in any one place for any length of time. It will be seen from this that he was quite incapable of following ordinary routine, and that his poise was so upset that it effectually prevented him from doing

any work or from living an ordinary life. No history could be obtained of any gastro-intestinal disturbance, nor could any signs be discovered of intestinal putrefaction. There could be little doubt that the case was one of disseminated sclerosis associated with neurasthenia, and that the case was in its early stages as regards the sclerosis, but that the neurasthenia was advanced and so conglomerated with the organic nerve disease as to make it exceedingly difficult to separate the condition into the two parts, and to say exactly where the disseminated sclerosis commenced and where the neurasthenia finished.

With regard to the further history of this case, some progress was made under suitable treatment, which consisted in cacodylate of strychnine in the early stages, followed by valerianate of ammonia and cimicifuga. The mental symptoms improved gradually, but were easily brought back by any small disturbance, such as a chance meeting, or a surprise visit from a relative or friend, so that the progress was tedious and not as satisfactory as could be wished.

This case is mentioned as illustrative of the ways in which functional nerve disease can be combined with organic; and, as is so often the case, unless due care is used in making the diagnosis, all the symptoms in these cases are attributed to the status neurasthenicus, and the underlying organic mischief overlooked. The history in these cases, moreover, is often so characteristic of neurasthenia, that a diagnosis of this nature is rather liable to be made before the preliminary examination, and so the real nature of the case masked. Although many of the symptoms which are seen in one form or another of organic nerve disease may be present in neurasthenia, several signs (*e.g.*, optic neuritis, etc.) are never seen. It may be that this nervous mimicry, as pointed out by the late Dr. Savill, is due to the sudden alteration in the blood-supply of the central nervous system, thus producing similar signs to those seen in organic disease, or when more or less permanent damage has been done through embolus, extravasation, etc. Unfortunately, we are not in possession of sufficient evidence to say exactly what is the condition in these cases, but it is evidently of a nature to defy microscopic detection, as nothing abnormal is found on post-mortem which would account for these symptoms in cases of simple neurasthenia.

RECENT PUBLIC HEALTH WORK.

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FORTY-THIRD ANNUAL REPORT OF THE LOCAL GOVERNMENT BOARD 1913-14 (MEDICAL OFFICER).

Another valuable report has recently been issued by the Medical Officer of the Board dealing with a large amount of administrative work accomplished during 1913-14. There are 8 sections in all as follows:—

Section 1.—Sources of information—births, sickness, deaths, derived in part from national, and in part from international sources.

Section 2.—International hygiene—foreign intelligence work and the measures taken to prevent the importation of disease.

Section 3.—Infant and child mortality—statistical statements and schemes for child welfare work.

Section 4.—The acute infectious diseases.

Section 5.—Tuberculosis—its administrative control and statistics.

Section 6.—Venereal diseases—control of syphilis and ophthalmia neonatorum.

Section 7.—Miscellaneous work of medical department—local investigations by inspectors, plumbo-solvent water supplies, food inspection, the Board's pathological laboratory, the Government Lymph Establishment, Vaccination, etc.

Section 8.—Auxiliary scientific investigations.

To the report are attached two appendices, dealing with many important matters.

From these details it will be seen that the report covers a wide area of work, and contains much interesting reading. Out of such a mass of valuable material, it is difficult to condense satisfactorily for the purpose of this article. Matters

will, therefore, only be dealt with in proportion to their interest to-day.

(A) INFANT AND CHILD MORTALITY (SECTION 3).

On July 30th, 1914, a circular letter was issued by the Board to all county councils and sanitary authorities, dealing with schemes for maternity and child welfare, and the distribution by the Board in connection with such schemes (when officially approved) of grants not only to local authorities, but also to voluntary agencies. Such grants are to be made in aid of expenditure in respect of clinics, dispensaries, or other institutions primarily concerned with the provision of medical and surgical advice and treatment, as well as in respect of the salaries of health visitors and other officers engaged for this work. Much good has been accomplished in the past, but more extended and systematic measures are necessary for the future, so that preventive measures may be taken during the ante-natal as well as during the natal and post-natal periods. Improved ante-natal and natal conditions are wanted, to be followed by systematic post-natal attention extending up to school age. Medical advice and, where necessary, treatment should be continuously and systematically available for expectant mothers, and for their infants and children with home visiting. This can best be accomplished by the institution of—

- (a) Maternity centres, to which expectant mothers and mothers with infants and little children may be referred for advice and treatment,
- (b) Schools for mothers, where advice as to baby feeding, clothing and treatment generally is available,
- (c) Infant clinics for the medical and surgical treatment of infants and children, who are too young to attend the school clinics which are being provided by Educational Authorities under the Education (Administrative Provisions) Act, 1907 and the Local Education Authorities (Medical Treatment) Act 1909.

A complete scheme would comprise the following elements, each of which will, in this connection, be organized in its

direct bearing on infantile health.

1. Arrangements for the local supervision of midwives.

2. Arrangements for—

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| <i>Ante-Natal.</i> | { | (1) An ante-natal clinic for expectant mothers.
(2) The home visiting of expectant mothers.
(3) A maternity hospital or beds at a hospital, in which complicated cases of pregnancy can receive treatment. |
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3. Arrangements for—

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|--------------|---|--|
| <i>Natal</i> | { | (1) Such assistance as may be needed to ensure the mother having skilled and prompt attendance during confinement at home.
(2) The confinement of sick women, including women having contracted pelvis or suffering from any other condition involving danger to the mother or infant, at a hospital. |
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4. Arrangements for—

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| <i>Post-Natal.</i> | { | (1) The treatment in a hospital of complications arising after parturition, whether in the mother or the infant.
(2) The provision of systematic advice and treatment for infants at a baby clinic or infant dispensary.
(3) The continuance of these clinics and dispensaries, so as to be available for children up to the age when they are entered on a school register, <i>i.e.</i> , the register of a public elementary school, nursery school, crèche, day nursery, school for mothers, or other school.
(4) The systematic home visitation of infants and of children not on a school register as above defined. |
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There must be co-operation between voluntary and official workers.

All are agreed as to the duty of the State towards the early environment of the child, the need for ante-natal and natal care, as well as pre-school and school care. The well-known axiom to the effect that "every child born has a right

to live," may now be enlarged and extended so as to read, "Every child born, *and every child even when unborn*, has a right to live." Ante-natal clinics, maternity centres, infant clinics, milk depôts, pre-school age and school clinics will, under the fostering care of the Local Government Board, become the routine of all administrations.

(b) TUBERCULOSIS—ITS ADMINISTRATIVE CONTROL AND STATISTICS
(SECTION 5).

Section 5, dealing with tuberculosis, is important, and sets out the administrative control adopted by sanitary authorities under the guidance of the Board, emphasizing the need (a) for an intimate relationship between the work of the tuberculosis officer and that of the medical officer of health in relation to the visitation of notified cases and the examination of contacts, etc., and (b) for care being exercised in keeping the information obtained under the notification clauses of the Public Health (Tuberculosis) Regulations, 1912, strictly private and confidential, so as to avoid any interference with the work of an employee by an employer, more especially in the case of domestic servants, school teachers, dressmakers, etc. Visits as the result of notification are necessary; otherwise, the object of the notification of the disease would be lost. This remark applies to non-pulmonary as well as to pulmonary forms of the disease—the former (the non-pulmonary) arising from the latter (the pulmonary).

The infectivity of pulmonary tuberculosis is generally admitted, but the extent of such infectivity is so important that the Royal College of Physicians have deemed it advisable to deal with the matter officially by passing the following resolution:—

"That in view of the exaggerated fear of the infectivity of pulmonary tuberculosis entertained by the public, the consequent unnecessary disabilities imposed upon sufferers from the disease, and the opposition raised in many places to the establishment of institutions for its detection and treatment, a reassuring statement with regard to the degree of danger attaching to contact and communication with tuberculous persons be prepared by the College and issued

in its name at an early date."

This resolution has since been acted upon, and the following report on the infectivity of tuberculosis has been approved and issued by the College:—

1. Tuberculosis is an acquired disease, but certain constitutional types may be inherited which render the patient specially susceptible to infection, and there is reason to think that such susceptibility is an inherited character.
2. The infective agent is the tubercle bacillus. This may be contained in the various discharges and excreta of the patient, and especially in the sputum of those suffering from pulmonary tuberculosis. No discharge is infective unless it contains the tubercle bacillus.
3. Cases of tuberculosis of bones, glands, and internal organs from which there is no discharge or which do not furnish any excretion, and cases of arrested pulmonary tuberculosis, have never been proved to be infectious.

(By arrest is here meant that all the symptoms and physical signs of activity have disappeared, and the sputum has either ceased or no longer contains tubercle bacilli.)

4. The means by which tubercle bacilli may enter the body are:—

(a) *By inoculation* through a wound or abrasion of the skin. This has occasionally occurred to workers in laboratories, *post-mortem* attendants, and others dealing with tuberculous material, and is presumably the way in which lupus is acquired.

(b) *By inhalation*.—Susceptible animals are readily infected by the inhalation of air containing tubercle bacilli, whether in droplets or suspended as fine dust, but in the spread of the disease among human beings the latter appears to be the more important means of infection. The sputum or other discharges, whether on soiled handkerchiefs, linen, garments, or elsewhere, when dried, may become pulverized, and in this con-

dition may be readily dispersed in the air of a room. That droplets of sputum are less important agents of infection is suggested by the fact that the incidence of consumption upon the staff, nurses, and others engaged in hospitals for the treatment of tuberculous disease, where all discharges are carefully disposed of, is not above the average in the general population.

(c) *By swallowing.*—Dust infected by the tubercle bacillus may be conveyed to food and so enter the alimentary canal; or infection may occur more directly in the act of kissing, or by consumptive and healthy persons using the same food utensils. As about 10 per cent. of the milk supplied to large cities contains tubercle bacilli derived from infected cows, this avenue of infection is particularly important in the case of children. The bovine tubercle bacillus is more commonly responsible for tuberculosis in young children than in adults, but the proportion of cases due to it varies very much in different localities.

(d) There is no evidence that tuberculosis can be conveyed to others either by the breath alone, or by emanations from patients, or by their garments, unless soiled by dried sputum or discharges.

5. The spread of tuberculosis is favoured by uncleanness, overcrowding and imperfect ventilation, and is hindered by the opposite conditions. Experience in hospitals and other institutions where the following precautionary measures have been thoroughly carried out indicates that by such measures the risk of infection is reduced to a minimum, namely :—

(a) The careful disposal and disinfection of the sputum and other discharges.

(b) The disinfection or destruction of soiled handkerchiefs, clothes, and linen.

(c) The removal of dust by frequent moist cleansing of the floors, walls, etc., of the rooms.

(d) The supply of abundant air space and free ventilation with fresh air.

No risk is incurred by living in the immediate neighbour-

hood of institutions for the treatment of tuberculosis which are properly conducted.

The Board emphasizes the need for the systematic examination of contacts on the following grounds :—

1. It frequently happens that the first notified case is not the first clinical case of tuberculosis in a given family, and from the standpoint of prevention the detection of such earlier cases is important.
2. Examination of contacts frequently discovers patients in an earlier and more curable stage of the disease than the notified patient. Until a much higher proportion of total cases of tuberculosis than at present are recognized in this early stage, the number of patients who can be returned as "cured" is not likely to be satisfactory.

All the home contacts of every notified case of tuberculosis (both pulmonary and non-pulmonary) should be examined, either at a dispensary or at their own homes—provided, of course, that they are willing for such an examination. Systematic examination of the household has a greater educational effect on the public and is more efficient in discovering sources of continuing infection than the desultory examination of a few contacts. Indeed, the more systematic the examination of contacts the better, if the disease is to be eradicated. Patients in the very early stages of the disease are discovered, and treatment can be supplied to them with every prospect of the disease being arrested and the patients prevented from passing from stage 1 to stage 2 of the disease.

(c) AUXILIARY SCIENTIFIC INVESTIGATION (SECTION 8).

Section 8 deals with auxiliary scientific investigations carried out on behalf of the Board, *e.g.*, Dr. Gordon's report on an experimental investigation in relation to epidemic parotitis, Professor Leonard Hill's report on ventilation and on the effect of open air and wind on the respiratory metabolism, Drs. Eastwood and Griffith's reports on the incidence and bacteriological characteristics of tuberculous infection in children, Dr. Andrewes's report on the causes of arterial

degeneration, etc. Dr. Andrewes's report is set out in full in Appendix B, No. 1, and the results at which he arrives are given under the following headings:—

1. The degree to which *infective conditions* play a part in the premature occurrence of arterial degenerations;
2. The need for some definite criterion, if possible a numerical one, by which the degree of degeneration can approximately be gauged, and the value of estimating the *calcareous* change in the arterial walls for such a purpose.

The investigations have been made with the arches of aortæ. The invasion of the aortic wall is by way of the vasa vasorum in general infections of the blood stream, and the invading organisms may be those of the primary infection or others (*e.g.*, one of the common saprophytes of the body). It is presumable that what applies to the aorta applies to other arteries also.

Syphilis plays the greatest havoc in arterial degeneration, but other infective conditions (*e.g.*, rheumatic fever, measles, typhoid, acute staphylococcal and streptococcal septicæmiæ, scarlet fever, malignant endocarditis, etc.) cause similar degenerations, but to a much less marked extent—a chronic inflammatory infiltration, mainly along the course of the vasa vasorum, consisting of (chiefly) lymphocytes with a few plasma cells and some endothelial proliferation. Apart from syphilis and from certain other aberrant cases, the calcium percentage of the dried arterial wall offers a rough numerical expression of the degree of degeneration, sufficiently close for the construction of curves and spot maps. The same remarks apply to the mere ash percentage. In cases of high blood-pressure, the aorta does not appear to become degenerate for a considerable period. There is some evidence that the abuse of alcohol leads to premature arterial degeneration.

The net result of Professor Leonard Hill's investigations on ventilation may be described as follows: The old views concerning the supposed poisonous nature of respiratory exhalations fail to be supported by scientific evidence, and it is the physical qualities of the air—the heat, moisture, movement,

that are of paramount importance to health.

DEFECTIVE CHILDREN.

Dr. Kelynack has edited a book on the important subject of defective children, the different chapters being written by well-known authorities. The book is published by Messrs. J. Bale, Sons and Danielsson, Ltd. The existence and strength of a nation ultimately depend upon the survival of its children and their physical and mental health, and a national scheme of medical inspection, medical cure and treatment, and physical education becomes a necessity. Every form of defectiveness must be reduced to its minimum, and every child must be fitted in every respect for its purposes in life, physical as well as mental. All forms of defect must be rectified, arrested, or ameliorated, and no energy must be spared to solve the problems, which relate definitely to the care and control of defective children—a wide subject, wider than the mere dealing with the diseases and disorders of children from the ordinary standpoint of medical treatment. Even this latter duty is becoming an important one, the results of inspection showing an enormous number of medical defects existing amongst children of school age, *e.g.*, defects of vision and hearing, dirtiness, ear disease, adenoids and enlarged tonsils, ringworm and other skin diseases, carious teeth, heart disease, malnutrition, and tuberculosis. These defects, when found, must be remedied; in other words, medical treatment is the national corollary of medical inspection—the latter being useless without the former.

Dr. Kelynack's book deals with much broader problems. There are 27 chapters in all, and every branch of the subject receives attention. Without belittling other contributors' work, attention may specially be drawn to Dr. Marr's article (chapter 2) on the mentally defective child, and to Drs. Hunter, Hewat, and Sullivan's articles on Idiots and Imbeciles, the Epileptic Child and Criminal Children (chapters 3, 4 and 5). Defective growth and development in infancy, childhood, and youth, and spinal defects in young subjects are also dealt with fully in chapters 14 and 11 by Dr. Gilford and Mr. Tubby; whilst the work on the subject that is being carried out in other countries than the British Isles is set out in chapters 23,

24, 25, 26 and 27, dealing with defective children in Canada, the United States, France, Germany and Hungary respectively.

Mental and moral defects require as much attention as physical defects. Prevention must include treatment and remedial measures. Official and voluntary organizations must all help towards the one goal. Under the Mental Deficiency Act, segregation becomes possible, but too much is not to be expected from such a measure, as mental degeneracy is a progressive condition, the breeding-ground of the defective lying in the class above the "obvious." The ideal is to destroy the breeding-ground, but how? Certainly not by Act of Parliament. Education in its widest sense is what is wanted and to effect that time is necessary.

"Special" schools for "special" children, open-air schools, and residential schools for defective children are slowly but surely being provided through the country—open-air schools especially. There are many different varieties of open-air treatment of school children, viz., country holidays and country schools, play-ground classes and open-air class-rooms, day open-air schools and residential open-air schools, and sanatorium schools. The next stage is to make open-air schools unnecessary by managing *all* schools on lines nearly approaching those of the open-air schools—abundance of fresh air, facilities for washing and bathing, proper dietary, medical supervision, rest at suitable intervals, etc. Here again it is education in its widest term that is necessary, and this education will take time. It has already commenced in good earnest and all the various factors that are assisting are fully set out in Dr. Kelynack's book, which, as a reference, will prove invaluable for all those engaged in public health work, more especially that department that deals with the wide subject of medical inspection and treatment of school children. There are other children, however, besides those attending school—the absentees from school and children below school age, who need catering for in respect of medical inspection and treatment. Baby clinics, schools for mothers, child welfare schemes, etc., must deal with them.

EPIDEMIC CEREBRO-SPINAL MENINGITIS.

Several outbreaks of epidemic cerebro-spinal meningitis, or

"spotted" fever, amongst the troops during 1914 and 1915 have directed renewed attention to the disease, the ætiology of which is still vague. The germ is the diplococcus intracellularis meningitidis of Weichselbaum, and is found in the cerebro-spinal fluid. The germ is best stained with borax-methylene blue, and grows on glycerine agar, but is evanescent, and rapidly dies on exposure.

The symptoms of the disease vary from the mild to the fulminant variety, and are protean in character. Characteristic symptoms are vomiting, intense headache, convulsions, drowsiness, and coma, with muscular stiffness in the back of the neck, and even head retraction, Kernig's sign, *tâches cérébrales*, pains in the muscles and joints on movement, etc. The value of anti-meningitic serum in preventing death has been proved, as shown by a marked reduction in the mortality rate from the disease, even the "fulminant" variety being cured at times. The earlier the serum is used, and the larger the dose in which it is used, the better, and it must be introduced *directly* into the spinal canal. Statistics already to hand show a reduction of mortality from 75 to 25 per cent., and a further reduction is to be expected with earlier diagnosis, improved methods of administration, and a more exact knowledge of the disease itself. Debility and insanitary surroundings are predisposing factors, but the disease may attack the healthy.

THE AFTER-CARE OF THE CONSUMPTIVE.

As time goes on and statistics accumulate, it is more and more being realized that the after-care of the consumptive is as important as the care. The one is the complement of the other. To keep a patient at a sanatorium, and to arrest the disease there, and then to return him to his old conditions of life, can only have one result—a relapse. The care is rendered useless by the want of after-care. How is this to be avoided? The problem is one that seriously faces all those engaged in public health work and administration. Bureaux must be established for the purpose of finding suitable occupations and modes of life for patients discharged from sanatoria. Patients must be followed up. The objects of the after-care are summed up by the National Association for the Prevention of Consumption and other forms of Tuberculosis under the

following headings :—

1. To prevent relapse.
2. To combat the fear of infection felt by employers and fellow workmen.

In addition, there is the obligation to look after the patient's home and family, not only whilst the bread-winner is away at the sanatorium, but also after he returns. "After-care" must be seen to by a committee, which may be voluntary or municipal, or, what appears to be better, voluntary supervised and assisted by the municipal authority. Funds must be available, and these can best be obtained from the rates. The main portion of the duties of the committee will be to deal with the suitable employment of consumptives, some of whom will be able to return to their old occupations, whilst others will require to have new occupations found for them. In all cases, it is important to remember the need for proper methods of life being carried on by the patients at their own homes after returning from work and during holiday times. The rules and regulations of the sanatorium must be rigorously carried out at the home ; to put it epigrammatically, the sanatorium must be brought to the home.

The finding of suitable occupations of a light nature and of an open-air character is beset with difficulties, but these difficulties must be faced if consumption is to become a disease of the past. Colonies may have to be formed by the sanitary authority, at least, for a small proportion of the patients. All occupations of a dusty nature and those carried on under confined, over-heated, or badly-ventilated conditions are taboo ; occupations connected with gardening and farming are ideal.

LEAD POISONING IN INDUSTRIAL CENTRES.

Cases of industrial lead poisoning are now compulsorily notifiable to the Chief Inspector of Factories, with a few exceptions, viz., house, coach, and ship painting. The industries mainly responsible for lead poisoning are smelting of the ore, manufacture of red and white lead, manufacture of pottery, house, coach, and ship painting, printing, plumbing, manufacture of electric accumulators, and file cutting. Strange to say, lead miners do not suffer from lead poisoning ; in the ore,

the lead is in a pure metallic state or in the form of sulphide, which is extremely insoluble. When the smelting of the ore begins, poisoning ensues from the fumes or dust. Both white and red lead are equally dangerous.

How does the lead enter the body? There are three modes of entrance, according to Sir Thomas Oliver—the skin, the respiratory passages, and the alimentary canal, and it is the last-named that is the commonest. The symptoms vary, beginning with a premonitory paleness, which may be so pronounced as to receive the name of “Saturnine cachexia.” The red corpuscles of the blood are reduced in numbers and structurally changed—the so-called basophile degeneration. Gastric disturbances follow, with a disagreeable metallic taste in the mouth in the morning and a consequent dislike for food. A meal of bread with coffee and milk before beginning the day’s work is a preventative of lead poisoning. Acute abdominal pains follow, with vomiting and constipation (obstinate constipation)—the abdominal pains or colic being extremely severe as a rule. Severe headache is also a frequent symptom. The blue lead line on the margin of the gums close to the teeth is symptomatic, though not an absolute sign, and so too is the paralysis of the hands, or what is known as “wrist-drop,” which is generally bilateral. The brain and central nervous system may be also affected with convulsions, loss of vision, etc., whilst the kidneys are often the seat of structural changes leading to the blood vessels generally being weakened, with subsequent bursting, *e.g.*, in the brain (apoplexy).

All workers in lead do not suffer from lead poisoning; indeed, its manifestations are protean. A small quantity of lead may produce serious symptoms, and *vice versa*; the symptoms may develop silently; the high susceptibility of some workers as compared with others, especially young females, is remarkable. Some may work in lead for years before showing symptoms, whilst others may present serious symptoms within a day or two of commencing work. As a rule, lead elimination keeps pace with lead absorption, and health is maintained. If this balance is interfered with from any cause, the lead accumulates within the system and poisoning shows its symptoms. Thus, indigestion, influenza, alcoholism may cause plumbism in workers in lead, due to

elimination being interfered with, or absorption may become excessive, due to a bigger dose of the poison escaping into the workshops owing to closure of ventilators, the shutting down of exhausts, leakages in machinery, etc.

There is another form of lead poisoning—self-caused in women by the use of diachylon or oleate of lead as an abortifacient. It is taken in the form of pills of lead plaster and of bitter aloes, which are obtainable for a few pence, and much pain and suffering and misery results from their use—acute colic, vomiting, severe headache, paralysis of hands and forearms, and even death. As Sir Thomas Oliver so pithily puts it, “for twopence expected life is blighted, maternal life is endangered, family relationships are embittered, the home exchequer is impoverished, and the finances and administrative resources of a hospital are called upon to undertake the treatment of a tedious illness, all through ignorance on the part of women of the dangers of taking diachylon, or of their obstinacy in not listening to sound advice.”

Drinking water is another source of lead poisoning, peaty water exercising a strong plumbo-solvent influence on lead pipes.

The treatment of industrial lead poisoning is both preventive and curative, but it is with the former only that this article treats. No susceptible persons should be allowed to work in lead factories or workshops, and those workers already employed should be under frequent medical examination. Work places should be well ventilated, and hoods and exhausts provided for the purpose of removing lead-dust at the places where such dust is created.

Further, the abolition of female labour in white-lead works has prevented a great amount of lead poisoning, and similar good results would accrue, if Governmental measures were taken to prevent the sale of diachylon pills except under medical prescription.

The preventive measures for a lead-infected water supply suggest themselves—remove from the water, or prevent the access to the water of, the plumbo-solvent ingredient or ingredients. Finally, double electric baths are being fitted in several lead factories, and in these baths the feet, hands and forearms of workers are immersed once or twice a week.

Under the influence of these baths, symptoms disappear, even the characteristic paleness, the blue gum line, etc. The lead is supposed to be drawn from the system by the well-known electric law by which metallic compounds are readily split up into their components by means of electricity, and in this way the metal or *ion* goes to one pole, viz., the negative, and the acid radicle to the other, the positive. The worker immerses the feet in a bath in which the positive electrode has been placed, and the hands and forearms in another bath in which the negative electrode has been placed, and an electric current of 15 volts and 30-40 milliampères is allowed to pass for half an hour.

NITROGLYCERINE AS AN INDUSTRIAL POISON.

Increased heart action followed by retardation, loss of vision followed by severe racking headache, and other nervous manifestations amounting to acute mania, sum up the symptoms met with amongst workers in the manufacture of nitro-glycerine. The general physiological action of nitrites may be summoned up as follows:—Cardiac depression; vascular dilatation and heart palpitation by vagus paralysis, relaxing vascular tone and heart inhibition; lowered respiratory action from paralysis of respiratory muscles; the conversion of oxy-hæmoglobin into methæmoglobin with a lowering of the body temperature and a sensation of surface heat; throbbing pains in the head and pulsating arteries, quickened pulse and vertigo; polyuria and artificial diabetes.

Very few workers are immune to the ill-effects of the drug, but susceptibility varies with different workers, and the symptoms are worse during warm weather. Fortunately, a comparatively high degree of immunity is established after three or four days' work in the atmosphere, but such immunity is soon lost, so much so that absence from work for a day or two will cause a return of the symptoms on returning to work. Hence, the common practice amongst nitro-glycerine workers, according to Dr. Ebricht of San Francisco, of placing some of the product on their hatbands during periods of absence from the factories in order to maintain their immunity. There are no permanent after-results. The severe racking headache is characteristic,

beginning, as a rule, in the forehead and moving to the occipital region, where it remains from an hour or two to as much as three or four days. Restlessness, inability to lie quiet, and insomnia accompany the headache.

INDUSTRIAL SKIN DISEASES.

4 per cent. of skin cases are occupational, *i.e.*, connected, directly or indirectly, with the occupations of those suffering, the irritant gaining access through the hair follicles and the openings of the sweat ducts, more especially when the protective layer of grease, which is normally on the skin, has been removed by washing with soap.

These occupational skin diseases may be classified as follows :—

A. Direct.

1. Mechanical, *e.g.*, abrasions and bruises, ulcers, callosities, etc.
2. Atmospheric, *e.g.* : (a) Abnormal temperatures. (b) Abnormal humidity. (c) Abnormal air pressure. (d) Excessive light or light containing too many actinic rays.
3. Parasitic (animal and vegetable).
4. Spirochætal, *e.g.*, syphilis.
5. Bacterial, *e.g.*, anthrax, glanders, tuberculosis, leprosy, etc., and other infectious diseases.
6. Chemical, *e.g.*, aniline dyes, chrome, lead, arsenic, etc.

B. Indirect.

1. Certain skin diseases aggravated or prolonged because of work of a particular kind affecting the general health of the worker.
2. Certain skin diseases arising from compulsory residence in a particular climate where the work is carried on.



SOME PRACTICAL POINTS IN THE THERAPEUTICS OF THE INTERNAL SECRETION EXTRACTS.

By T. BODLEY SCOTT, M.R.C.S., L.R.C.P.

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THE series of brilliant articles in the January and February numbers of THE PRACTITIONER, for which we owe a deep debt of gratitude to the Controlling Editor and to the contributors, have opened up to many of us a new vista of hope and usefulness in the treatment of disease, a vista entrancing in its nature, and of which no man can see the end.

Hitherto the medicinal treatment of disease has been chiefly carried out by extraneous remedies, by drugs that are quite foreign to the human body. The action of these drugs, although they are of great value, is often difficult of explanation, and still more difficult of regulation. Take, for example, the actions of opium and belladonna. How greatly they differ in different people and at different ages of life. This may be said of almost all our vegetable pharmacopœia. When we come to the inorganic remedies, we are on rather surer ground, for many of these are not foreigners, and the dosage can be more accurately measured. Iron, iodine, phosphorus, and the sodium and potash salts already exist in our bodies, and may be classed more as special body foods than as drugs.

When we come to the consideration and examination of the internal secretion remedies, we feel that we are on different ground altogether, almost on holy ground; for here we are dealing with the inner secrets of life itself, with those organs that control and activate not only each other, but the great sympathetic nervous system, and all the vital processes of the body. Our knowledge of them is still in its infancy, and our medicinal preparations are none too perfect; but already the treatment of disease is revolutionized, and the duration of life prolonged. The secretions of most of these glands, which are poured into the current of the blood, are absolutely necessary

to life and health; from some points of view they appear to be antagonistic to one another, but in other respects helpful and compensatory. In their totality, they are the essence of life itself. Our aim must be, by patient study and experiment, to bring these powerful and apparently divergent remedies, into such use and combination, that they will make harmony again out of the discord we call disease.

The study of the thyroid gland and of its secretion must, I think, take the first place, partly because it was the first of these glands to be investigated accurately, and partly because it enters, more than the others apparently, into the ordinary morbid conditions of life. I am not going over the old ground of thyroid insufficiency in early life, into cretinism, etc., but I want to draw attention to the many manifestations of its functional disorders in middle life and in old age. When once our eyes are opened to the many minor symptoms of the disorders that thyroid disturbance causes, we shall be able to clear up and solve many puzzles, and to bring many ailing folk back to health. The two extremes of myxœdema and of Graves's disease ought seldom to occur, if we have the chance of seeing the premonitory symptoms and, in future, I think, their full development will have to be regarded as among the opprobria of medicine.

The treatment of these disorders, however, needs very watchful care, for one must always remember that the condition of hyperthyroidism can easily pass into the opposite of myxœdema. The early symptoms of hypothyroidism in adult life, which may last for years and never pass into their full development, are chiefly slight and transitory infiltration of the skin in certain parts of the body and in the lower eyelids especially; a common example of this infiltration, often unobserved, is in the lower part of the leg, just above the ankles. This, if it does not pit on pressure, and if not caused by varicose veins, is almost a conclusive symptom. The hair becomes thin and brittle, and often loses its gloss and colour; the skin generally is dry and harsh, and the scalp shiny; the body temperature is subnormal, and hands and feet are often persistently cold; there is especially a troublesome sense of chilliness over the loins and upper part of the thighs, which makes these persons very sensitive to draughts of cold air,

and they often get catarrhs. The general result is low vitality, mental and physical, a sense of chronic fatigue, and a feeling of inability to face the work of life. Naturally these conditions lead on to premature senility, and so to the loss of many working years.

All these troubles can be much relieved and often cured by thyroid treatment, but the treatment will have to be continued in some measure throughout the rest of life. Five grains of thyroid extract twice a week are often enough to keep the disease well in check. In this treatment, however, we are often brought to what appears to be a deadlock, by the action of the remedy on the heart. Many patients will soon complain of cardiac pain, a little giddiness or faintness, and an irregular pulse; this is often accompanied by insomnia and they think that they cannot continue the treatment. My experience of these cases is that they can quite safely go on with thyroid, if you give them something to counteract these bye-effects. I make it a rule to test carefully the blood-pressure before and during treatment. As a rule, I think, hypothyroidism is associated with hypertension, the tension generally being about 160 mm.-170 mm. This increase of tension is what one would naturally expect from deficiency of thyroid secretion. If there is this increase of tension, one can safely push thyroid, unless the pressure fall too low. But there are certainly cases which show hypotension, and these are the cases that take thyroid badly. This disability is safely and easily overcome by giving suprarenal extract as well, and by carefully watching the blood-pressure. This should be kept as near 140 mm. as possible. To get this result, we must give about 10 grains of suprarenal extract daily and about 5 grains of the thyroid; these, of course, are only approximate doses, but with the help of the sphygmomanometer it is not easy to go wrong. (The Liquor Adrenalin cannot be depended on, if given by the mouth.) Here is a typical case:—

A lady, aged 58, showed many of the minor symptoms of hypothyroidism, and was putting on weight so fast that her breathing became much embarrassed. On 5 grains of thyroid daily, she rapidly lost weight, and at first felt better; the peculiar puffiness of the eyelids passed away, and her hair regained its gloss and colour. After three weeks, she got all the cardiac symptoms I have described with insomnia. I found her tension 120 m. I gave her 10 grains of suprarenal extract daily with

the thyroid, and after 10 days her tension had risen to 145 m., and all the disagreeable symptoms passed away.

With the exception of thyroid extract, nearly all the internal secretion remedies have the property of raising tension, and, when any of them or of their various combinations are being given, this should always be remembered and watched for. This warning is emphasized by the fact that, in later life, there is the tendency in so many to develop arterio-sclerosis. The connection between hypothyroidism and arterio-sclerosis is, I believe, a very close one, and the early treatment of the first will often prevent the development of the latter.

Carnrick has brought forward a combination, which he calls hormotone; this is made, I believe, of extracts of thyroid, pituitary, ovary, testis, pancreas, and spleen; this seems to be a really valuable tonic, but it certainly raises tension, though it contains no suprarenal, and it can cause unpleasant symptoms. Carnrick recognizes this, and gives a note of warning. Laboratory experiments seem to disprove many of our clinical theories, for instance the power of these extracts in raising tension, but the steadily continued use of them by the mouth will, I am sure, establish their claims. In the treatment of obesity by thyroid, when there is no clear indication of hypothyroidism, the observation of tension is just as necessary.

In health, subcutaneous or intravenous injections of digitalin or digitoxin have given negative results, but no one can doubt that, in morbid conditions, such as arterio-sclerosis and chronic Bright's disease, digitalis is often a dangerous drug, owing to its power of contracting the arterioles, and thus raising the blood-pressure. This difficulty can, no doubt, be overcome by combining vaso-dilators with it. Lauder Brunton expresses his opinion very strongly and clearly on this subject in the last edition of *Therapeutics of the Circulation*, on pages 312 and 313. This is one of those cases in which the cautious man will rather follow clinical experience than laboratory experiment.

My argument, then, is this, that if we hope to make good use of these new and powerful remedies, we must, if only for our reputation's sake, use the sphygmomanometer as a sure and safe pilot. Nowadays, no one, I hope, trusts to the fallacious sense of touch. The "tactus eruditus" here is a danger and

a snare.

Léopold Lévi makes this statement in his article in the February number of *THE PRACTITIONER*: "In certain physiopathological complexes, such as senility, a large part is played by thyroid inadequacy. Senectitude is essentially an attribute of subthyroidism, though other glands are equally involved in its production. It affects every tissue of the body, but its influence upon the entire endocrinic system is very far-reaching and profound." Carrying this fact steadily in our minds, shall we not be able to conquer, or at any rate ameliorate, some of the distressing facts of old age? As an instance, I give this case:—

A man, aged 85, who for some time had shown the early symptoms of brain degeneration, suddenly, after a tiring day, collapsed. He was almost unconscious, and lay prostrate on his back. For days he could hardly swallow, the power over both sphincters was completely in abeyance, symptoms of bed sore commenced, and he looked a hopeless dying case. Yet there was no true paralysis, no hemiplegia, no absolute aphasia; he could just move every limb slightly, if pressed to do so. Reflexes were present, but feeble. His arterial pressure was 165 mm. As a forlorn hope, I gave him thyroid (5 grains daily). He at once began to improve, in a fortnight all incontinence was gone, and he could swallow well. Now, three months after the attack, he can walk 2 miles a day, and his tension has come down to 140 mm.

No other treatment was used. Could any of our older remedies have worked this miracle?

At the same time, I had another case in a lady, aged 56. I had not seen her for some years, but she has, I think, been myxœdematous all her life. She collapsed suddenly, and lost all power over limbs and sphincters as in the other case, but the swallowing was not affected; she developed a bed sore, and appeared to be dying. Thyroid treatment has quite restored her to her former state, and her mental condition, they say, is better than before. In this case, too, the arterial tension was 165 mm.

I feel convinced that when we have learned to handle these new weapons more skilfully, our power over the diseases and collapses of old age will grow in proportion.

Lastly, I must draw attention to the influence of thyroid medication on arterio-sclerosis and on atheromatous disease of the arteries. Though laboratory experiments show some divergence, I think it must be an established fact, that generally, thyroid extract is a tension depressor. The original experiments by Oliver and Schäfer seem conclusive, and Biedl

in his great work on the internal secretory organs corroborates their conclusions. Oliver says, in his last edition of studies in blood-pressure : "I have observed that ingestion of the thyroid gland increases the calibre of the arteries and lowers the arterial pressure." And Lauder Brunton says : "Thyroid gland when taken by the mouth dilates the peripheral vessels, makes the skin warm and moist, and quickens the pulse." Theoretically, then, thyroid ought to help us much in our treatment of hyperpiesis and of arterio-sclerosis, and in a fair number of cases it does so, especially perhaps in the fat cases, but in a good many cases it is disappointing. I think the explanation of the failure is this : Thyroid gland given by the mouth much increases the general metabolism of the body ; the nitrogen output is increased, as well as the output of lime salts, which carry with them some of the phosphorus of the system, and this phosphorus cannot always be spared. If the kidneys are healthy and doing their work well, they can get rid of these increased metabolic results and good ensues, but if the kidneys are diseased and are incapable of any extra work, it is easily seen that more harm than good may be done. The body becomes like a frightened audience in a theatre, with the means of exit partially blocked.

I think this explanation will give us this fair working rule : push thyroid if the kidneys are sound but not unless. I think, too, it will be found that the greatly increased excretion of lime salts will help atheromatous cases especially. The loss of phosphorus can be well made up by giving lecithin ; in this connection, it is well to remind ourselves that sanatogen, *et hoc genus omne*, contain large quantities of lime salts. It may be this increased excretion of lime salts, that accounts for the improvement in cases of enlarged prostate, which some writers have noticed.

The suprarenal glands come next in importance, I think. Brunton says, "The suprarenal and pituitary bodies and their extracts have an action opposite to the thyroid. It is supposed that they constantly pour their secretions into the circulation and thus maintain the arterial tension." An opposite action need not be an antagonistic one, but may be supplementary. In the marvellous complex we call life, action and interaction are so bound up together, that we can only

see, as through a glass darkly, a few isolated facts, and sometimes their sequences; yet what a fertile field of beauty and usefulness lies open to the physiologist of the future. As far as we can see at present, it is the action of the suprarenal extract on the circulation that gives it its value. Trials have mostly been made by hypodermic or intravenous injection of the liquor adrenalin, but the effect of these is very short-lived, and I believe the chief therapeutic value will lie in the extracts given by the mouth. In this way, sustained effects will be obtained. Oliver and Schäfer's early experiments, which have taught us so much, were made by giving strong doses of a glycerine extract made from the suprarenal glands of the sheep. In this remedy we have, not only a counterpoise to the distressing effects of thyroid treatment, but in many morbid conditions a very powerful circulation tonic.

Post-mortem examinations, in cases of acute infective diseases, such as diphtheria and pneumonia, have shown that the suprarenal glands, though often enlarged, have lost all their special characteristic properties, that is, they contain nothing that will raise blood-pressure or dilate the pupil. This must mean that the adrenalin has been exhausted, and this accounts chiefly for the prostration and very low blood-pressure that we find at the end of these diseases. As soon as tension begins to fall below normal, I always give, in such cases, suprarenal extract freely, five grains every two hours, and generally with very good results. In many elderly people, with cold extremities and a feeble circulation, if the tension is low, this will be found a very valuable remedy; the tension will always tell one when to stop, and none of the unpleasant symptoms so often produced by digitalis appear.

Perhaps the most remarkable effects of this remedy are seen in asthma, not only in spasmodic bronchial asthma, but in true cardiac dyspnoea. According to Jagic, bronchial asthmatic spasm may be checked by the subcutaneous injection of adrenalin. Eppinger and Hess explain this result by the assumption that the stimulation of the sympathetic by adrenalin overpowers the muscular cramp arising from the increased stimulation of the vagus. Whatever the explanation may be, the results of this treatment are very

astonishing. Dr. de Havilland Hall, I think, first suggested the addition of two minims of liq. trinitrin to the six or seven minims of liq. adrenalin, and the effect is increased by doing this. In not a few cases, I have found unpleasant feelings and great pallor come on for a few minutes after this injection, whether with the trinitrin or without; this can be prevented by diluting the adrenalin with boiled water. My rule is six or seven minims of liq. adrenalin in the syringe, and fill up with the water, making in all 20 minims.

I have one patient, aged 78, who has had this three times a day for many years. It has never lost its effect, and has not brought on any rise of tension. In cases of extreme cardiac dyspnœa, the effects are quite as striking; here it may be joined with strychnine, and it will often pull a man from the jaws of death. Even where there is high blood-pressure, there need be no fear. This, perhaps, may be accounted for by the remarkable fact that adrenalin, while contracting the systemic arterioles, dilates the coronary arteries and their arterioles. Biedl says, "The very small rise of blood-pressure that follows subcutaneous injection of adrenalin, may be largely due to a reduction in absorption, brought about by a local constriction of the vessels at the site of the injection; to a certain extent the substance blocks the way of its own absorption, and the trinitrin may overcome this to some extent." As a practical measure, steady, gentle, upward massage over the site of puncture will hasten the action materially.

In many cases of Graves's disease, I have found suprarenal extract, given by the mouth, steadily relieve the cardiac symptoms; it has been my routine treatment for years, and I know of no medicinal treatment so effectual. If the blood-pressure is much above normal, it can be advantageously combined with some depressor-remedy like the hippurate of ammonia. I believe the treatment of Graves's disease in the future will be by X-rays to the thyroid and by suprarenal internally. The partial excision of the gland sometimes produces wonderful results, but one must remember the tendency of Graves's disease to pass on into myxœdema. The operation has enabled you to cross the river for the time being, but you have burnt your boats.

CASE WITH COMMENTS.

A CASE OF ERYTHEMA NODOSUM.¹

By DAVID WHYTE, M.B., CH.B.

Late House Surgeon, Dunedin Hospital.

IN THE PRACTITIONER for August, 1913,² there is an interesting analysis, by the Medical Registrar of St. Mary's Hospital, of 100 cases of Erythema Nodosum.

In view of the fact that in no instance in that series was the formation of fibrous nodules observed, the following case may, perhaps, be worthy of mention in the records of this obscure disease :—

Miss —, ætat 19 years; no previous illness; family history of rheumatic fever.

Onset was on October 14, 1913, with fever, headache, anorexia, diarrhœa, and sore throat. I first saw her on October 20, when characteristic nodes were present over both legs from ankle to knee, the largest being two and a-half inches in length, and over the extensor surfaces of both wrists—indurated, painful, and extremely tender to the touch. Temperature 103; headache, anorexia. Diarrhœa was troublesome. Both tonsils were much inflamed, and most of the teeth showed advanced caries.

Fresh nodes continued to appear for a week over both arms, extending up to and over the elbows, both legs, and both sides of the forehead. One node appeared over the left nasal bone. Diarrhœa ceased two days after the commencement of salicylate treatment. A phlyctenule appeared on the left ocular conjunctiva close to the outer corneal margin, with marked conjunctivitis of both eyes. The temperature at each visit continued to be 102°–103°.

During the third week, the nodes began to fade, leaving much thickening, and the conjunctivitis cleared up. The girl's mother called my attention to a lump near the left elbow, which proved to be a single nodule, hard, painless,

freely movable under the skin, and the size of a large pea—probably a fibrous nodule such as are associated with rheumatism. This was the interesting feature of the case. At the same time the patient complained of præcordial pain, and examination revealed a soft systolic murmur, with an increase of one inch in the left cardiac dulness. Temperature still continued to be 101° – 102° .

By the end of the next week, the fibrous nodule had almost disappeared, the induration on the forehead and legs was much less, desquamation over the nodal sites was advanced, the cardiac murmur had disappeared, and the temperature was approaching normal. The subsequent convalescence was slow and uneventful.

Treatment by sodium salicylate, which was pushed to intolerance, appeared to have no effect on the course of the disease. The blood and urine were not examined.

In view of the doubtful infectiousness of erythema nodosum, it might be well to state that a sister of the previous case developed the same complaint in a milder form three weeks later. In this case, stiffness of the neck, with enlargement of the cervical glands, was a prominent feature.

REFERENCES.

- New Zealand Medical Journal*, April, 1915.
THE PRACTITIONER, August, 1913, p. 240.



Practical Notes.

GLUCOSE SERUMS.

Baumel and Cathala report excellent results obtained from the use of glucose serums in the treatment of infectious conditions with serious toxæmia, of prolonged inanition, of oliguria of mechanical origin, and others. Fleig of Montpellier has written fully of these serums, and divides them into two classes, isotonic and hypertonic. Hypotonic solutions have been tried, but have not been taken into use to much extent. The glucose serums can be used plain, or with the addition of different mineral substances, and Fleig has suggested the addition of various drugs.

I. Isotonic.

(A) *Pure glucose* :—

Glucose, pure crystallized	-	-	-	47 grammes.
Freshly distilled water	-	-	-	to 1 litre.

(B) *Glyco-mineral* :—

Glucose, pure crystallized	-	-	-	30 to 35 grammes.
Calcium chloride, anhydrous	-	-	-	2 to 4 „
Sodium glycono-phosphate	-	-	-	4 to 6 „
Distilled water	-	-	-	to 1 litre.
Glucose, pure crystallized	-	-	-	25 grammes.
Sodium bicarbonate	-	-	-	7 „
Distilled water	-	-	-	to 1 litre.

(c) *Medicinal serums* :—

(a) Sodium bromide	-	-	-	10 grammes.
Glucose -	-	-	-	15 „
Distilled water	-	-	-	to 1 litre.
(b) Theobromine	-	-	-	1 gramme.
Sodium phosphate (neutral)	-	-	-	4 „
Glucose -	-	-	-	20 „
Distilled water	-	-	-	to $\frac{1}{2}$ litre.
Diuretine	-	-	-	2 grammes.
Glucose -	-	-	-	20 „
Distilled water	-	-	-	to $\frac{1}{2}$ litre.
(c) Caffein	-	-	-	0.50 gramme.
Glucose -	-	-	-	20 „
Distilled water	-	-	-	$\frac{1}{2}$ litre.

Chauvin and Œconomos suggest the following to be taken by the mouth :—

Tincture of nux vomica	-	-	-	0.50 gramme.
Tincture of cannella	-	-	-	6 „
Glucose	-	-	-	150 „
Water	-	-	-	300 „

Hypertonic Solutions.

Glucose -	-	-	-	300 grammes.
Distilled water	-	-	-	to 1 litre.

Glucose	-	-	-	-	-	150 to 200 grammes.
Calcium chloride	-	-	-	-	-	3 to 5 „
Sodium glycerophosphate	-	-	-	-	-	5 to 7 „
Distilled water	-	-	-	-	-	to 1 litre.
Glucose	-	-	-	-	-	100 grammes.
Sodium bicarbonate	-	-	-	-	-	30 „
Distilled water	-	-	-	-	-	to 1 litre.
Theobromine	-	-	-	-	-	1 gramme.
Neutral sodium phosphate	-	-	-	-	-	4 „
Glucose	-	-	-	-	-	120 „
Distilled water	-	-	-	-	-	to $\frac{1}{2}$ litre.
Diuretine	-	-	-	-	-	2 grammes.
Glucose	-	-	-	-	-	120 „
Distilled water	-	-	-	-	-	to $\frac{1}{2}$ litre.
Caffein	-	-	-	-	-	0.50 gramme.
Glucose	-	-	-	-	-	120 „
Distilled water	-	-	-	-	-	to $\frac{1}{2}$ litre.

The amount usually given is 500 c.c. a day of Sithes solution, isotonic or hypertonic, by hypodermic or intravenous injection. Half this quantity is given at a time. Fleig recommends the injections to be given every other day. Helmotz uses for children a 6 per cent. solution of glucose, giving 100 c.c. each day.

In addition to their nutritive effect, these solutions have a remarkable diuretic action, when given hypodermically or intravenously, as well as a cardiotonic and antitoxic one. The isotonic solutions are used for hypodermic injection, and the hypodermic for intravenous.--(*Journ. de Méd. et de Chir. prat.*, 25 April, 1915.)

FOR EARACHE.

℞ Mentholis						
Camphoræ	-	-	-	-	-	ana gr. xx.
Phenolis	-	-	-	-	-	gr. xv.
Glycerini	-	-	-	-	-	ʒi.

Misce.

"Ten drops to be warmed and dropped into the ear."—(*Medical Review of Reviews*, Jan., '15.)

THE TREATMENT OF EPILEPSY.

According to Brane, increased intracranial pressure is to be found in almost every epileptic, and is very pronounced just before and during the paroxysm. It is difficult to say whether this is due to increased blood-pressure in the cerebral blood-vessels, to transudation of blood-serum into the brain substance, or to an excessive tension in the ventricles from a sudden increase in the quantity of cerebro spinal fluid. Probably, all three factors co-operate. A somewhat similar phenomenon occurs in bronchial asthma and angio-neurotic oedema, in which there is periodically sudden exudation from and increased tension in the vessels of the bronchi and skin respectively. Brane advocates a method of treatment for true or

essential epilepsy based upon efforts to reduce this intracranial pressure to normal, and to keep it in that state.

The treatment comprises hygienic, dietetic, and mechanical measures. The usual medicinal measures adopted do more harm than good, for they create drug habit, impair digestion, retard elimination, are harmful to the circulatory system, are prone to disorganize the blood constituents, and greatly depress the mental and physical activities, making the patient more or less useless to himself and others.

The hygienic measures consist in the careful supervision of rest, exercise, clothing, bathing, amusements, and personal habits. Plenty of fresh air must be available. Not too much sleep should be allowed. Strenuous exercises must be avoided, and the patient must be kept from all nervous strain, emotion, and excitement.

The diet should consist largely of milk, eggs, bread, butter, raw and cooked fruit, and some vegetables. There should be a minimum of meat, fish, peas, beans, lentils, etc. Salt meat, fried food, sweets, and spices should be forbidden, as well as tea, coffee, tobacco, and alcohol. Plenty of water must be insisted on. Constipation must be prevented, preferably by olive oil, but sodium phosphate and cascara may be advisable.

The mechanical measures to reduce intracranial tension include venesection, trephining, lumbar puncture, autotransfusion, catharsis, diuresis, and diaphoresis. The first three are the most important, but the most practical method is to secure the reduction of intracranial tension by reducing the general blood-pressure through venesection. The technique is simple. The veins at the bend of the elbow are made prominent by a tourniquet or bandage applied with moderate firmness above the elbow. Under strict aseptic precautions, a few drops of a 2 per cent. solution of novocaine are injected over the median basilic or cephalic vein. An incision with a sharp scalpel is made, about a quarter-of-an-inch long, through the skin directly through the vein selected. A firm compress and bandage is applied afterwards, and the wound heals in three or four days leaving a very small scar. The amount of blood taken varies with the size, weight, and condition of the patient. If he is plethoric, as many epileptics are, and an adolescent weighing about 145 lbs., from twenty to thirty ounces should be removed. It is better to take too much rather than too little.

Brane has found it necessary, in his cases, to repeat the venesection every two to six months. The indications are a return of dizziness, "fullness in the head," and flushing of the skin, the usual premonitory symptoms of a fit. In patients treated by this method, there seems to be a growing tendency towards restoration of the stability of the cerebral cell and normal blood-pressure, with gradual lessening of the epileptic "habit," which is shown by the fact that the venesection is required less frequently as time goes on.

The contra-indications to venesection in epilepsy are few, chiefly anæmia, in which case the lessened viscosity of the blood, causing the increased intracranial tension by transudation of serum into the brain substance and ventricles, must be dealt with, and steps taken to tone up the circulation. As a rule, no drugs are required, but an occasional dose of sulphate or citrate of magnesia may be found useful in some cases to assist elimination and reduce blood-pressure.--(*New York Med. Journ.*, 20 March, 1915.)

Reviews of Books.

Indispensable Orthopædics: a Handbook for Practitioners. By F. CALOT, translated from the Sixth French Edition by A. H. ROBINSON, M.D., M.R.C.S., and LOUIS NICOLE. Pp. 1175, with 1252 original figures, and 8 coloured plates. London: Baillière, Tindall and Cox. 21s. net.

IN writing a book, with this title, the author must have encountered considerable difficulty in deciding which subjects in orthopædic surgery may be regarded as indispensable; and therefore we have here a presentment of the author's view on the relative importance of the various affections. Naturally, as we should expect from Dr. Calot's reputation, a considerable portion of the volume deals with surgical tuberculosis, and particularly with its treatment. With much of this we are in accord, particularly with the open air, complete general and local rest, instead of early operative measures. We think that surgeons are deeply indebted to the Berch-sur-mer school for their advocacy of conservatism, and we congratulate them upon their persistence and the fact that their results have carried conviction to so many in this country and elsewhere.

That this book of Dr. Calot has passed through six editions, and has been translated into five languages, is ample proof of the need for it, and that it supplies a want. Its rather disjointed style renders it difficult to read, and makes of it a book of reference rather than a treatise. Nevertheless, it is full of valuable material, and the translation will prove useful to English readers. We do not see always eye to eye with Dr. Calot in various details, e.g., the use of camphorated naphthol, for it has been noted by other surgeons that serious symptoms of naphthol poisoning have ensued, and we prefer camphorated thymol in the treatment of tuberculous abscesses. So long, however, as surgeons realize the dangers following the opening of abscesses by the knife, and the security and safety of repeated operation and injection, we are content, even if we differ in details. In addition to tuberculous affections, scoliosis, rickets, genu valgum, flat foot, infantile paralysis, congenital dislocation of the hip, congenital club foot, torticollis, Letile's disease, osteomyelitis, and arthritis are discussed.

The translators have performed their part well, and the printing and general production of the book reflect credit on the publishers. We think however, if the material had been divided into two volumes, with a complete index in each, the book would have been easier to handle.

Sclero-Corneal Trephining in the Operative Treatment of Glaucoma. Second Edition, revised and enlarged. By ROBERT HENRY ELLIOT, M.D., B.S. Lond., Sc.D. Edin., F.R.C.S. Eng., Lt.-Col., I.M.S. Pp. 187 + xxvi. Fig. 45. London: Pulman and Sons. 7s. 6d. net.

IN the review of the first edition of this book attention was called to the

completeness with which the subject was put before the reader, and so great was the appreciation that a second edition was needed before the first edition had been in print eight months. In this edition, the latest elaboration of technique is discussed, and there are three new chapters and twelve additional illustrations. The new chapters deal with the experiences of other surgeons in trephining: a comparative study of the modern operations for Glaucoma; and some anatomical and pathological points which are not embodied in the other chapters. Everyone must admire Elliot's energy, painstaking thoroughness and enthusiasm, which, together with his vast clinical experience in India, have undoubtedly been factors in furthering the widespread adoption of his method of sclero-corneal trephining, the intrinsic merits of which alone demanded the attention it has received. No one really interested in glaucoma can afford to overlook this book and the wealth of detail will disappoint none. Whether trephining will continue to enjoy the universal favour which it has obtained, time and longer experience of its remote effects alone can determine.

Renal Diagnosis in Medicine and Surgery. By Dr. VICTOR BLUM. Translated by WILFRED B. CHRISTOPHERSON. Pp. 144. London: John Bale, Sons and Danielsson, Ltd. 7s. 6d. net.

THIS is intended as "a handbook of the theory and practice of functional testing of the kidney." The importance of estimating the function of the kidneys as a preliminary to operation, or as an aid to prognosis, in diseases of these organs, is now generally admitted. Dr. Blum's book is one of a number which have appeared in France, Germany, Austria, and this country, in the past few years. The theoretical side of the subject is very freely discussed, but the practical application is hardly so clearly described as might have been expected. Fallacies in the methods known to exist, and to detract greatly from their absolute value, are not sufficiently considered. Altogether, while there is much useful information, and evidence of a great deal of commendable industry, in these pages, there is lacking a clear-cut clinical picture either of the cases in which the methods are really of service, or of the value of the information derived from them.

The translator is to be congratulated on presenting the matter, for the most part, in clear English. Occasionally, a difficulty is apparent in getting away from the involved phraseology and peculiar construction of the original language.

A bibliography of German literature is given, French and American literature is practically, and English entirely, ignored. The book will be of interest to the urological surgeon, as a presentation of the views of the Vienna school.

Manuel de Cystoscopie. By E. PAPIN, Chef de Clinique des voies urinaires à l'Hôpital Necker. Pp. 326. Paris: F. Giffier. 15 francs.

THIS is an introduction to the use of the cystoscope, plainly written by one who is evidently accustomed to instruct the beginner in this most difficult method of examination.

The instruments are described, and the method of their use. Practical

details as to the sterilization and preservation of the instruments, the preparation of the patient and the bladder, are given. There are chapters on the cystoscopic diseases of the bladder, catheterization of the ureter, the use of functional tests, pyelography, etc.

The illustrations are crude, and for the most part semi-diagrammatic, but they illustrate the meaning of the text, and prepare the way for practical demonstration on the living subject.

This is a most useful book for anyone who is commencing cystoscopy, and wishes to gain a solid groundwork for more advanced work.

The Localization of Bullets and Shell Fragments. By FRANCIS HERNAMAN-JOHNSON, M.D. Pp. 23. London: H. K. Lewis. 1s. net.

THIS interesting pamphlet is "a record of personal experience." The author has no pet method; the methods and instruments he used and describes were more or less improvised; this is quite as it should be, and makes for advance in the art of localization. We congratulate Dr. Hernaman-Johnson on his work and his opportunities most cordially.

The author mentions (p. 1) X-ray "distortions"; distortion implies twisting or bending; now with X-ray perspective, as with other cases of ordinary perspective, it may sometimes be correct to speak of "exaggeration," but never of "distortion."

The author has found out what could have been predicted, namely, that the projection of a niche upon a parallel plane is always a circle, whatever the position of the radiant point. Practically he has found it unsafe to take the centre of the luminous circle as the fluorescent screen (thrown by the circular opening in the diaphragm of the tube box) as the position where the normal ray cuts the screen; we must employ rather more reliable devices if we are not to be sadly misled.

On p. 18, writing of the image on the screen, he says "One sees the bullet." Is this so? Is a glance at the shadow on a window blind the same as a glimpse through the window?

As regards the author's remarks on systematic co-operation between the operating surgeon and his X-ray colleague we thoroughly agree. We think, too, that his remarks are most judicious on priority of claims as to methods of localization, and venture to quote them in support of our own experience:—"A number of men have in this instance been faced by the same problem. The number of possible solutions is strictly limited, and thus similar methods were bound to be brought out independently. It is often mere chance which determines who publishes first a given procedure."

Notions pratiques d'Electrothérapie appliquée à l'urologie. By Dr. DENIS COUTADE, ancien interne des Hôpitaux. Pp. 212. Paris: F. Gibbler. 10 francs.

THIS volume describes the application of electricity in the treatment of diseases of the urinary organs. The first 80 pages are devoted to a general description of the different forms of electricity. Then follows a description of the practical use of electricity in individual urinary diseases, such as "neuralgias" of the urinary organs, paralyses and spasms, spermatorrhœa, and organic diseases such as cystitis, tumours, prostatitis, hypertrophy and

cancer of the prostate, and stricture and polypi of the urethra.

Rather more space is devoted to the neuralgias than the subject merits. Neuralgia of the kidney, bladder, and urethra is looked upon with some suspicion in this country, and requires very careful investigation before adopting electrical treatment.

The results of treatment are hardly mentioned in most of the diseases. It would be interesting, and is necessary for a proper discussion of the subject, to have some details and statistics, for instance, in regard to the electrical treatment of simple and malignant enlargement of the prostate.

Electrical treatment of stricture of the urethra is discussed with greater judgement than is usual in writings upon the subject.

The book certainly fills a want, and its usefulness, which is undoubted, would be increased by greater detail in the direction indicated.

The Year Book of Open-Air Schools and Children's Sanatoria. Vol. I., 1915.

Edited by T. N. KELYNACK, M.D. London: John Bale, Sons and Danielsson, Ltd. 7s. 6d. net.

THIS volume is devoted to a *résumé* of the subject of children's open-air and sanatorium treatment. It is a compilation written by men who have made a study of the special branch with which they have been asked to deal, and will, the editor hopes, prove to be a useful work of reference to the medical profession generally, and especially to those doctors who have much to do with schools and the treatment of tuberculosis in childhood. So far as we have been able to test the work, it would appear to fulfil these aims with great success. The number of contributors is large, and their communications seem to cover the ground thoroughly. The book is profusely illustrated, and the illustrations are on the whole good, though the printing of some of them lacks the finish which we have learnt to expect, even in ephemeral productions. The most interesting of the papers deal with the ideas and progress in foreign countries, especially in Switzerland and the United States. In some respects the progress in these countries has gone on different lines to those followed here, and the results are consequently of greater importance to us than the more familiar facts available at home. On the whole, the Year Book would seem to have justified its existence, and we hope that it may become established.

Defective Children. Edited by T. N. KELYNACK, M.D. London John Bale, Sons & Danielsson. 7s. 6d. net.

THE title of this volume illustrates how much more widely than in past years defects, both physical and mental, are now studied. Dr. Kelynack has engaged the services of a large number of medical men and others to write the individual chapters, and though perforce this method leads to a certain amount of repetition it has the great advantage of representing views which are, if not conflicting, at least not entirely in harmony. The scheme of the book is to deal in each chapter with one aspect of defective children, and at the close of the chapter to give, so far as is possible, the chief authorities on the special aspect. To anyone desiring a complete view of any particular subject such a bibliography is invaluable, and especially so when the literature has grown so rapidly to such enormous proportions. It is

obviously impossible within the limits of a short review to mention more than a few points of interest. The chapter on the "Deaf Child" contains many valuable hints as to diagnosis, the difficulty of which is perhaps but little appreciated except by those to whom it is a perpetually recurring problem. The statement is made that "meningitis is the chief cause of acquired deafness." We do not know on what grounds this axiom is based, but in our experience deafness is a rare complication of endemic meningococcus meningitis, the only form of meningitis in which recovery is common in this country. In the epidemic form, with which we are now visited in a mild degree, the complication is certainly more frequent. The chapter on "Cardio-vascular Defects" is written with great wisdom. We should like especially to commend the warning: "The dangers of finding something wrong with a healthy heart appear to be much greater than the danger of over-estimating the health of a diseased heart. To find something wrong with a healthy heart—especially where there is a nervous parent—may do much to ruin the child's character for life." We could wish that the writer had added to his article some words on the necessity of examining into the question of dilatation without a murmur in children who have been suffering from some infection; in our experience this is not uncommon and is a cause of prolonged un-health.

There are chapters on children's defects in Scotland, Ireland, and Canada, which contain some interesting figures, but the briefest perusal of these articles is enough to show how widely the problems differ in different countries, or even in different parts of the same country.

The book is well printed on rather indifferent paper. It contains so much of value to the physician that we hope and expect that a second and enlarged edition may soon be required.

A Text-Book of the Diseases of the Nose and Throat. By JONATHAN WRIGHT, M.D., and HARMON SMITH, M.D. Pp. xii + 683. 14 Plates (Coloured and Plain) and 313 Figs. in the text. London, Baillière, Tindall & Cox. 21s. net.

THE name of Jonathan Wright is well-known over the civilized world as a writer of experience in diseases of the nose and throat. The exceptional feature of this text-book is the emphasis laid upon ætiology and pathology, and upon no other basis can any logical and scientific discussion of disease be attempted. The general arrangement of the volume is that common to most text-books. The description of the anatomy and physiology of the nose is especially to be recommended. The account given of diseases of the accessory sinuses and their treatment is also very full and excellent; but the inclusion of deviations and spurs of the nasal septum with the sequelæ of chronic rhinitis will be regarded by some rhinologists as a confusion of cause and effect, and this is accentuated by the description given of their ætiology. Nor will everyone agree that the submucous resection is "Essentially an office operation." The chapter on Nasal Neurosis is another excellent one, and we heartily endorse the warning against patients "who lust after nasal treatment often of a bloody and painful kind." It is significant also to find such a sentence as "'Pollantin' and various sera, such as Dunbar's serum, have been said to cure certain cases, but so have Christian Science, the mind cure, and countless quack

remedies."

The whole work is highly commendable for the clearness of its descriptions, the common sense of the opinions expressed, and the general excellence of its plate. A few of the illustrations, however, are somewhat lurid in their colouring and it is not easy to see the reason why the face and facial structures should be depicted with the same depth of red.

The Dispensary Treatment of Pulmonary Tuberculosis. By HILDA CLARK, M.B. B.S. Lond. 8vo, pp. 280, with numerous Tables. London: Baillière, Tindall & Cox.

THIS full and excellent report contains an account of Dr. Clark's experience of the tuberculin treatment of phthisis and suspected phthisis at the Street and Portsmouth Tuberculin Dispensaries, between June 1910 and December 1911, and June 1911 and June 1913, respectively. Beginning with a general account of the scheme and methods employed, Dr. Clark devotes the main bulk of the volume to a description of the cases treated and their environment. The most interesting part of the volume, speaking generally consists of 40 pages towards its end in which she gives an analysis and discussion of the cases treated with tuberculin. She is herself a firm believer in the value of this treatment, using tuberculin freely and pushing it with what some would consider boldness. She draws the general inference (p. 224) that "tuberculin shows some influence for good in so many instances, that where this does not occur the method of handling it and the combination with other remedies"—general hygienic advice and oversight, co-operation with Care Committees, and other medical measures, of which sanatorium treatment is the chief—"must be blamed, in part at least, for the failure." Contra-indications to the use of tuberculin in phthisis she holds to be possibly non-existent and practically unproved. Only a few febrile or sub-febrile cases were given the treatment; in general, febrile patients were kept at rest in bed at home, or at an observation hospital, until the temperature settled and the patient was well enough to attend the dispensary without rise of temperature. For diagnostic purposes Koch's old tuberculin was employed, or the albumose-free preparation known as T.A.F. The general routine of treatment was to begin with a mild preparation of tuberculin, P.T.O., to go on to a stronger such as P.T. (concentrated bovine tuberculin), and afterwards to employ old tuberculin or one of the newer bacillary-emulsion preparations; in each case working up rapidly from small initial to large terminal injections. Dr. Clark's experience has not shown her that "tuberculin reactions", occurring accidentally in the course of tuberculin treatment, actually do the patient any harm; indeed, she seems to think it is desirable that they should occur in patients who will "only respond to vigorous treatment."

The book contains an elaborate discussion and classification of the cases treated, numbering 114 in and about Street, 553 at Portsmouth. Satisfactorily to summarize Dr. Clark's results is hardly possible; she gives a clear account of her methods of treatment, her reasons for employing tuberculin in any given case, and the results she has obtained. She is strongly in favour of the tuberculin treatment of phthisis, particularly (naturally enough) when the treatment is combined with other adjuvant methods. Her volume is well written, contains a vast amount of work, and should be read by all medical men who have to treat pulmonary tuberculosis.

Preparations, Inventions, etc.

LYCRYL.

(London : Eucryl, Limited, Lant Street, Southwark, S.E.)

A NEW saponified cresol preparation, which contains 50 per cent. of free cresol, and is stated to be of entirely British manufacture. It is claimed that the original strength, three times that of carbolic acid, is maintained, the ingredients being tested to ensure absolute constancy. It forms a clear solution with distilled waters, and has a solvent effect upon grease, mucus and such like. In the selection of cresols, care is taken to avoid all those having an irritating or injurious action on the skin. As it has been introduced to take the place of the German preparation, it is used for exactly the same purposes.

VILLACABRAS.

(London : E. Del Mar, 12, Mark Lane, E.C.)

THIS natural purgative mineral water is obtained from the springs of Villacabras in the province of Madrid, which is the exclusive property of a French Company. Analysis shows a very high content of sodium sulphate 122 g. per litre, and very little magnesium sulphate, less than 1 g. per litre. It is free from the sulphureous smell and bitter taste present in many mineral waters, and, being to all intents and purposes a concentrated solution of sodium sulphate, small doses only are necessary, so that it can be given in milk, etc. Before bottling, the water is filtered through porcelain.

"LUBAFAX" SURGICAL LUBRICANT.

(London : Messrs. Burroughs Wellcome and Co., Snow Hill Buildings, E.C.)

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THE PRACTITIONER.

SEPTEMBER, 1915.

EDITORIAL.

THE exigencies of the War have brought about, for the Profession, a position fraught with much uncertainty and not a few difficulties, concerning both the present and the future. The plans and arrangements for the forthcoming Session at many of the Medical Schools are not definitely settled, for in some cases they have been closed down temporarily, owing to the Hospitals to which they are attached being used for military purposes, either exclusively or to a very large extent. There is also an element of doubt as to the number of entries that may be expected "now all the youth of England are on fire."

It has, therefore, been deemed advisable, on a matter of such urgent national importance, to collect all the information available on the subject, and to set it forth in one number of THE PRACTITIONER. With this information will be found included authoritative statements from some of the examining and other bodies, all of which, it is hoped, will prove to be not only interesting, but valuable as well, to every member and intending member of the Profession.

It is evident that the responsible authorities of the Hospitals and Medical Schools throughout the country are prepared to make a determined effort to provide all the educational facilities for the courses of study required for full qualification, and thus ensure that, both for present and future needs, there shall be no lack in the supply of thoroughly-trained and properly-qualified practitioners of medicine, whose services play so important a part in the maintenance of, and progressive improvement in, the welfare of the State.

THE VALUE OF UNIVERSITY TRAINING AS A PROFESSIONAL ASSET.

By SIR T. CLIFFORD ALLBUTT, K.C.B., M.D., F.R.C.P., F.R.S., D.Sc.,
LL.D., etc.

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THE course of events concerning medical education in the coming year cannot be foreseen. Taking Cambridge as a fair example, that the general course of studies will be gravely affected is, unfortunately, beyond doubt. Speaking generally, the number of undergraduates will be much diminished, how much no one knows. I understand that, at any rate, in many of our larger colleges the entries are on paper fair enough—say within 20 or 25 per cent. of the normal; but the tutors fear, nevertheless, that the number of young men who may find their way to the University will fall considerably short of the paper entries. It is usual of course for parents to enter their sons, at the colleges they individually prefer, some time, even some years, before the date of entering into residence, and no doubt many young men thus entered will fail to put in an appearance. Many are waiting for commissions, many are already enrolled in the Army in one way or another; in many cases, parents will have but too good reason to fear that war prices and war taxes, not to mention incidental curtailment of stipends or profits, may cut off or cut down the means relied upon for education. On the other hand, as many men will decide after the War to remain in the combatant Army, some shrewd parents may anticipate that the enormous wastage of young men by war will make more openings in the world for those who are now just too young to enlist, and may therefore use every effort, by capital expenditure on education, to give their sons the best possible equipment.

These considerations suggest to some of us that the medical entry may not, after all, fall much below the normal;

for if even before the War there was a "shortage" of doctors, still more will this be the case after it. In the Addenbrooke's Hospital, for instance, we have at present no resident medical officers; the honorary staff is dependent on more or less chance assistance, kindly given by hardworked juniors.

In the Universities of Oxford and Cambridge a chief feature, one which deeply influences the development of the student, is residence. Halls of residence exist in other universities, but somehow or other they have not "caught on," and do not gather in the bulk of the students; in Cambridge, however, it is the non-collegiate provision which does not increase, and, though convenient to a few men, is in the life of the university unimportant. Some of the most active and efficient of the colleges make provision to receive undergraduates almost as cheaply as they can live under the non-collegiate system, and with this advantage offer others which, if less ponderable, are more effectual. To say that the undergraduate belonging to a college derives more advantage from life in the microcosm of the university than from its formal teaching would be extravagant, but it would emphasize a very considerable element in his education. Thus he learns, within circumstances of reasonable safety, to resist the temptations of youth, to practise self-denial and self-reliance, to take showy persons and manners at their true value, to manage his fellowmen, to treat others with due consideration, to disperse small jealousies, to tolerate differences of opinion, and indeed to realize the value in the world of variety of minds and temperaments, to learn to organize himself, as in the disciplines of games and debates, with others in companies for common ends, to act with readiness and resource, and so on. For this reason, to make the university as various a little world as possible, all well conducted students are to be welcomed; it is pedantry, even in normal times, to refuse hunting men, polo players, and other keen vigorous men of character whose scholarship may be somewhat to seek. And in personal friendships of rare freedom and intimacy the budding mind expands in large discourse; trying all things, embracing all things. Those enthusiastic colloquies on religion and philosophy, arts and sciences, often carried on to the small hours of the night, live among the happiest of the older man's memories. Unless undergraduates live under the

same roofs, these vivid hours of intercourse do not grow up, or bear the same fruit.

At the beginning, then, of the new academical year all universities are to begin in sad depletion of men, both teachers and undergraduates, and of money. On this straitened prospect there is no need to dwell. In all spheres of activity, the higher purposes of mankind will lie long under the blight. But perhaps this deficiency may not be so manifest in the medical as in other faculties; the ranks of medicine now in many ways are thinned, and in this profession, as I have said, the foreseeing father will anticipate larger and better openings for his sons than in the past. Under the coming shortness of money a university education will undoubtedly be a heavier burden, but, if the investment be possible, it will prove a greater asset over the ordinary diplomas. The university student starts life from a wider standpoint; he has learned, if not to practise all those elaborate methods which modern medicine requires—indeed in the run of general practice many such manipulations are impracticable—yet to appreciate their meaning, and to know where they come in. He starts also with a wider knowledge of the ancillary sciences, having probably learnt some of them on the disinterested lines of Honours classes. In a family physician thus equipped, the consultant, on whatever lines he may work, recognizes one competent not only to recognize at once his points of view and his investigations, but also to co-operate more or less in the common diagnosis and treatment. In the Long Vacation Term, now in full swing at Cambridge, our classes are as large as usual, and the work is even keener—if this be possible—work pursued without the distractions of full term. The men, who have all passed the IInd M.B., are engaged in courses of general and special pathology, of bacteriology, of practical medicine and surgery, of sanitary and tropical work, and so on; they feel around them the influence of advanced students and graduates engaged in research. All these arrangements mean of course a longer and so far more expensive education; but, if the initial capital can be found, the interest comes in quickly, that is, if the student has taken advantage of them. And in my experience he does; in Cambridge, there are no more earnest, no better

mannered, no more efficient students in any faculty than in that of Medicine.

In this article, the reader will not look for the details of entry to the University, or for what I may call the "small bills" of his engagements during the three years of residence, of scholarships and fellowships in science, or again of the arrangements made for his practical experience in the larger fields of city hospitals. Are not all these things written in the Cambridge Students' Handbook (of which the annual new edition is in the press, or perhaps already published)? But on certain points I may offer some advice. The large majority of students, before differentiating themselves as medical students, take the better course of pursuing the normal procedure to an Arts Degree. In the whole course this direction may scarcely, if at all, lengthen the duration of it. Meanwhile a larger education, one more free from the narrowness of specialism, is received. Usually of course the student with his eye on medicine, will take up for his Arts Degree subjects, such as anatomy, chemistry, physiology, and so on, which will make good for him in the medical examinations. The few who can afford the time to go out in mathematics, classics, history or otherwise will of course develop their powers on a still broader foundation.

O! those examinations; in medicine, I suppose, inevitable! The medical man is more or less a State officer; he has certain statutory duties laid upon him; the State undertakes even to protect the public by giving a warrant of average efficiency in every practitioner on the register. Examinations are therefore inevitable. But inevitable as they may be, they are soul-killing disciplines! However, I will not bestow on the reader more of my tediousness on this subject. Suffice it to say that in Oxford and Cambridge—as of course elsewhere likewise—we keep the control of the examinations, during residence, in the hands of the teachers, though not without external assessors. For the final examinations, those for which the men return from their city hospitals, as this control is no longer strictly possible, we secure the aid of physicians and surgeons taken from the same ranks of clinical teachers of the large city hospitals. Above all, we avoid any encouragement of the professional examiner; and in

the paper work to discourage the "crammer,"—*i.e.*, the book-work teacher who beguiles the student away from the bedside and other practical work—we set few questions, and these easy in scope, but expect a high standard of answer; short essays, in fact, such as should draw out the original observations and reasonings of the candidates. Moreover, we give a large proportion of marks for the clinical examinations of both out-and-in patients; *i.e.*, in the one for quick and methodical diagnosis, and in the other for more exhaustive interpretation of disease.

Especial attention may here be drawn to a comparatively new ordinance of the University, which permits the undergraduate, or the boy still at school, to pass the first M.B. examination before entering into residence. This opportunity does not shorten the course, but devotes it to more advanced work. The student who enters into residence with his first M.B. in hand, proceeds at once to advanced courses in Chemistry which lead up to the department of Biochemistry, now of instant importance in physiology and pathology. The elements of physics and chemistry, and of biology, should form part—and perhaps now do form part—of the ordinary course of all public school boys; so that by the attainment of so much of these "Elements" as suffices for an intelligent student for his first M.B., little or no time is diverted from school teaching. Or for entrance he may take up any one or two of these three subjects, Physics, Chemistry, Biology, and so lighten his first year's work, or rather turn it to higher advantage. No inconsiderable number of our first year's men now pass the first M.B. on or before entrance, and, thanks to the schools, do so with credit. The standard of these examinations is at least as high as was that of the old first M.B., and as it is still in the case of the men who do not pass the same tests until the end of their first year. Such a standard in the entrance M.B. examination was properly required by the University, and there has been no difficulty in observing the requirement.

Very fortunately, after some controversy, the Senate—just before the war—accepted the Grant of the Education Board; so that with October the Medical Department will begin with resources substantially enlarged. The members of our staff upon whom we chiefly depend, not a few of

whom are at present away on military and government work, will return to residence, and with enhanced means and equipment the several departments will return to full activity. As we shall be less wholly dependent upon current fees, and richer in teachers and apparatus, we shall be better able to carry on work with undiminished energy.

These remarks may have some influence with parents who are hesitating before the strain of providing for a residence at Oxford or Cambridge. We shall not be surprised if, on the medical side, we hum along, not only with our usual vigour, but perhaps with something like our ordinary numbers. As the freshmen will come up in October without the example and ascendancy of the usual large body of senior men, they will be in a position to carve out their modes of life for themselves. It is a curious question what will come of this independence of ancient tradition and influence? At any rate, the discipline of hard times may be good for us all.

To parents, then, I would say that in my opinion medicine offers a better prospect, if not of wealth, at any rate of competency, than any other calling. The medical student will be wise if he prepares for the Conjoint Examination, but he will be wiser still if to the training for this diploma he adds a university course. This will cost him a little more time and a little more money, and for some years to come we shall all be poorer men; but this outlay may be balanced by a year less of school, and by more economy in college. Residence at a university may quite well begin, for a steady sensible youth, at 18 instead of 19. And the prospects of medicine are good not in private practice only. By this time next year the Allies will have defeated their enemy, and rigorous as national economy must henceforth be, governments will not be so shortsighted as to cut down those means by which a new and healthy generation must be reared to make up the loss of the present. This will mean a Ministry of Health; a development of the Public Health services, and of the care of children; provision for pathological laboratory work all over the kingdom, and so on; so that for those physicians who prefer official service or academic research, the growing opportunities will be limited only by the lack of a sufficient number of capable men to do the work.

HOW IS MEDICINE AS A PROFESSION FOR WOMEN AFFECTED BY THE WAR ?

By JANE WALKER, M.D.

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ON the outbreak of the War, everything seemed to come to a sudden stop. No one could sell anything, for no one wanted to buy. Buildings in process of erection were stopped, and arrangements for amusements and entertainments, *e.g.*, bands in the public gardens of health resorts, immediately cancelled. Very few people went to the theatre, or took a holiday; if away, they came back. A large number of people altered and simplified their meals. In the same way, no one employed the purely consulting physician, and many who had been in active and full practice found that for the time being, at any rate, their occupation had gone. With the consulting surgeon, however, matters were not nearly so acute. These occupations were regarded as luxuries, and people felt they could get along quite comfortably without them.

But the ordinary general practitioners, who hold in their hands the lives of the bulk of the 45 millions of the inhabitants of these islands, are rightly regarded as a necessity, and a necessity that cannot be manufactured at a moment's notice; it takes at least five years to create each one of them.

The month of August, when the War broke out, is generally a busy one amongst the general practitioners—partly because the hot weather brings numerous illnesses in its train that are comparatively non-existent in cooler seasons, and also because they are often doing the work of fellow practitioners who are having holidays—but last year it was busier than ever, for a large number belonged to the local territorial or other army unit, and, like the rest of the population, had to mobilize, leave civilian patients, and look after military ones. Again, many young doctors within the age limits joined the army at once, either obtaining a com-

mission or enlisting in the ranks. At the beginning, this course was also followed by a very large number of medical students. Later, the dangerous shortage that the procedure would entail, led to the prohibition of further enlistment of medical students, some even being sent back to finish their studies.

This entry into the War zone was not confined to medical men and students, for many medical women and students have, since the early part of the War, been serving in hospitals abroad, many of them voluntary organizations, though recognized by the responsible authority of the country where they are at work. Hospitals run entirely from the medical and surgical point of view by women have been in Belgium, and are at the present time, and have been for many months, working in France and Serbia. One of the women's units on the way to Serbia was stopped at Malta to attend to our wounded soldiers and sailors, moved there from the Dardanelles. At other hospitals in France, women are doing medical work as part of a mixed staff of men and women.

One of the earliest hospitals to be sent out to France under the French Red Cross was first in Paris and later at Wimereux. When it was no longer needed there, it was definitely appointed here under our own War Office, and is doing excellent work under the charge of the two doctors, Dr. Louisa Garrett Anderson and Dr. Flora Murray, who were chiefly responsible for the equipment, organization, and working of the hospital in France.

Along with this somewhat unexpected development of the medical women's movement, which certainly could not have been foreseen, has come an ever-increasing demand for medical women to take the place of medical men in every possible capacity, whether public or private. Many indeed are the posts for which women are specially suitable, and for which they have in times past made frequent applications only to be refused, whereas now these same posts are almost imploringly offered to them in repeated issues of the medical journals. The staffs of hospitals, especially of the resident sections, have been depleted so severely, that the work of many of the institutions has been hampered seriously. In the case of one well-known general hospital, out of a

staff of 31 only 18 remained to do the work, and in the case of a smaller hospital, in which the regular staff of resident physician and surgeons was four, it has been conducted fairly successfully for many months with one qualified resident and three unqualified assistants.

One large country general hospital applied to the Secretary of the Women's Medical School in an agony of necessity, "Send us *any* woman at *any* salary." This reminds me of an advertisement, in one of the northern papers, for a cook: "Any wages given and every night out in the week if desired." The advertisements, in the medical journals tell their own tale. Taking an example quite haphazard during May of this year, 1915, we find the following results:—In May, 1915, out of a total of 82 advertisements there are 7 which ask for women only; 9 require men only, the larger number of these, however, are for special War hospitals; 31 are definitely stated as willing to take either a man or a woman; and in 35 instances there is no statement as to sex. Compare this with another haphazard example in April, 1914. Out of 117 advertisements 5 were for women only, 3 being for Royal Free Hospital posts, where women have been the residents for many years; 49 were definitely applying for male practitioners only; while 63 did not state which sex was preferred, though one's general knowledge of the institutions concerned would lead one to suppose that the article required was of the masculine variety.

At the first sight, all this is very encouraging from the point of view of those who believe in medicine as a profession for women, either as private practitioners or in some department of public health, or as Hospital Residents. When, however, we look a little deeper into the present state of things, the outlook is not quite so hopeful. The larger proportion of the posts that have been offered to women are for newly-qualified or quite junior practitioners. There are practically none for the older and more experienced women doctors. It is true that the men who have left their posts are to a very large extent the young doctors, but there is a fair sprinkling of older men who are attached to Military Hospitals, sometimes even to two such Institutions. These men—consulting physicians—are at the same time carrying on

their regular hospital work as well as a somewhat augmented private practice, for the practical cessation of patients at the beginning of the War has been in many cases followed by a marked increase. Some months ago, I asked a consulting physician of the type referred to, who was deploring his over-work, what course he meant to take to get his teaching work done (he is on the teaching staff of a large medical school). He could see no remedy, the possibility of women doctors of standing and experience being appointed to help in the work never having even occurred to him.

The fact is that the bulk of the members of the profession have not yet learnt that women are practising medicine successfully, both from the point of view of finance and of reputation. They are quite willing for women to take their places as Hospital residents or other appointments so as to release them for the front, but they will expect the women to give up their posts with smiling faces when they return at the end of the War. It is true, however, that many will not return, and, consequently, that the preservation of the health of the nation will tend to be more in the hands of women than was the case before the War. This means that many more women will train as medical practitioners to keep pace with the demand.

At the present time, there is a great shortage of women doctors, even many of those home on furlough from India and elsewhere are filling the posts of men or women who are on more active service for their country. Some who have never practised before, and some who have long since given up practice, have also stepped into the breach, and are helping in every possible way.

This great increase of numbers, which is already taking place, will require a great increase of clinical opportunities for work as well as further laboratory and lecture accommodation. The London School of Medicine for Women (Royal Free Hospital) is raising a fund of 30,000*l.* to provide further accommodation for training women medical students. The Royal Free Hospital is being enlarged as much as possible, but it cannot expand sufficiently to take in all the students who will in the near future require hospital training. Attempts have been made to allow women to work at the men's schools in London, as is done in Ireland and in all the provincial

schools. Within this year a number of women students were received at one general hospital, and were working in the wards and out-patient department, but the experiment came to an end because the men students did not like the women working with them. At another London medical school, the advisability of admitting women as students has recently been discussed seriously and vetoed.

All this seems to point to what must come in the near future, viz., a combined medical teaching centre for London open without let or hindrance to both sexes. That the War will assist to this end is undoubted.



PROFESSIONAL SECRECY.

By WILLIAM A. BREND, M.A., M.D. (STATE MED.), B.Sc.

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THE limits of professional secrecy have been differently defined by various authorities. On the one hand, the claim has been put forward that all information gained at the bedside should invariably be regarded as confidential; on the other, legal obligations, moral duty, and common sense have combined to establish cases in which, in the view of most practitioners, deviation from the general rule is permissible. But it is not always easy, and may be impossible, to draw the line between the duty of speaking and that of maintaining silence; moreover, the advice given by professional bodies, as to the legal position of medical men in regard to this question, is sometimes inaccurate. The result is that many practitioners, who are too busy to study the law for themselves, have a hazy idea of the obligations of professional secrecy, and an exaggerated fear of the possible pains and penalties they may incur for breach of confidence. The medical profession will always insist that divulgence of knowledge gained during professional work shall occur as rarely as possible, and then only with strong justification; but every practitioner knows that there are occasions on which he is strongly tempted to make known certain facts regarding a patient for the benefit of the community or other persons. Often he refrains from so doing simply because he is uncertain of his own position, or is unduly afraid of the law of libel and slander, many practitioners being unaware of the extent to which statements made by them will be held to be privileged.

The most sweeping claim for professional secrecy which I have been able to find, is contained in the last report of one of those useful societies formed for advising and assisting medical practitioners in matters affecting their professional character or interests. It runs as follows:—"It is the duty of a medical adviser to keep secret all matters concerning his patients which become known to him in his capacity of doctor.

Nothing should induce him to disclose what in his professional capacity has come to his knowledge, unless he first has the consent of his patient to the information being given, and the patient's consent ought, if possible, to be in writing and signed by the patient." The only exception admitted in the report is the case in which a doctor acquires information which would enable him to prevent fraud or crime—as, for example, if a doctor is fully informed of the paternity of an illegitimate child, and subsequently sees a deliberate attempt being made by perjury to attach the responsibilities of paternity to an innocent man. Here it is held that, if the attempt is persisted in, the doctor should not keep silent. It will be convenient to reserve the question of divulging crime for separate treatment; but, apart from this, consideration will show that the rule as stated in this report is too wide.

STATUTORY NOTIFICATIONS.

In the first place there are the numerous statutory notifications and certificates, based upon clinical observation, which must be given under penalty for default. A practitioner who has attended a person in his last illness, for example, must give a certificate of death, stating to the best of his belief and knowledge the cause of death. If he conceals the fact that the cause of death was alcoholism, venereal disease, or abortion, he is not observing the law; although it is well known that in these cases the law is frequently disregarded, and is likely so to be, until it is provided that the certificate shall be sent direct to the registrar and treated as a confidential document.

A recent case illustrates the serious consequences to the practitioner, which may follow from wrongly filling up the certificate, even when a high motive can be pleaded. A doctor gave a certificate that a woman died from appendicitis, peritonitis, and cardiac failure; but, certain facts becoming known, an inquest was held, and death was then shown to have been due to criminal abortion. It was proved beyond doubt, that the doctor concealed the real cause of death in fulfilment of a promise to protect the girl's honour. Nevertheless, he was summoned for making a false declaration under the Births and Deaths Registration Act, and was fined 10*l.*; he was also required to appear before the General Medical Council,

from which authority he received a reprimand.

Another reason why practitioners sometimes hesitate to give an accurate certificate of death, when the cause reflects upon the moral character of the deceased, is the fear of rendering themselves amenable to the law of libel. It may be useful to state, therefore, that no action can be brought for a statement made about a dead person, unless it can be shown that the design and effect of the libel was to bring contempt on the family of the dead, and to stir up the public against them ; then, and then only, it might be prosecuted for.

The obligation to notify infectious diseases affords another instance of a duty imposed upon medical men, which involves making known information gained in a professional capacity. A disease to which the Act applies must be reported to the medical officer of health, regardless of the fact that public knowledge of a case of typhoid or small-pox occurring, say, in a hotel, school, or shop, may cause serious pecuniary loss to the proprietors. It must be remembered, too, that the obligation rests upon every practitioner who diagnoses the case. Not long ago a medical man was called in to see a servant-girl, whom he found to be suffering from scarlet fever, and it was arranged that she should go at once to her home in the country. Believing that the notification by the country practitioner would be sufficient, he did not notify the case in his own locality, and was summoned and fined for his omission. On the other hand, when a medical man, through an error of diagnosis, notifies a case which subsequently proves not to be a notifiable disease, he runs a risk of having an action for damages for negligent diagnosis brought against him ; in which case, it is not sufficient to show that he was in error, but it must be proved as well that he failed to exercise reasonable skill and care, regard being had to all the circumstances.

Notifications of industrial diseases and of births are further instances where medical men are required by law to give information acquired in the exercise of their profession.

MORAL OBLIGATIONS TO DIVULGE PROFESSIONAL KNOWLEDGE.

In addition to the obligations imposed by statute, there are certain others which by long practice, and with the tacit consent of the medical profession, have come almost to possess

the force of law. In particular, one may refer to the duty of giving information to the coroner in cases of death from unnatural causes. There is no statute which requires a medical man to give this information, but there can be little doubt that if the obligation were not practically always observed voluntarily, it would very soon be imposed by law. Failure to give notice would not prevent the matter from becoming known, but would result in the information reaching the coroner by a circuitous route after a delay which might be serious. Thus, if a medical practitioner attended in his last illness a person who died from the effects of violence, the practitioner would be acting strictly in conformity with the letter of the law if he gave a certificate stating that death was due to violence. The certificate would be sent by the responsible relative who received it to the registrar, and he in turn would forward it to the coroner. If the practitioner refused to give a certificate—a practice which is sanctioned by custom, though not by the Births and Deaths Registration Act, provided the cause of death is known—the death would ultimately be brought before the coroner by the registrar as an uncertified death. In the long run, therefore, nothing is gained by not giving immediate notice. On the other hand, the public advantages of taking this course are so obvious that medical men are not likely to object to it, and it is difficult to recall any protests against the custom on the ground that it involves a breach of professional secrecy.

In the great majority of deaths from violence or unnatural causes, the circumstances are known to many people, and the practitioner is rarely called upon to divulge anything which is not already common knowledge. Difficulty is apt to arise in cases in which the real cause of death is known only to the practitioner himself and to a few immediate relatives, and the death is of such a nature as to bring social stigma on the deceased. An instance has already been mentioned in the case of abortion, while other examples are afforded by certain cases of suicide, when death has been brought about in such a way as to attract little attention. I recall a case of an invalid confined to bed, in which there was nothing to suggest unnatural death, until an hypodermic syringe was found in the bedclothes, but, on an inquest being held,

suicide was clearly proved. In these cases, great pressure may be brought to bear upon the practitioner to give a certificate indicating that death was due to natural causes, and, from his personal point of view, refusal may adversely affect his practice. If, on the other hand, against his conviction he accedes to the request, and information eventually reaches the coroner from other sources, his position may be very serious.

Still more difficult are those cases—fortunately rare—in which, without having definite evidence, the practitioner suspects that foul play is responsible for the illness or death of his patient. An instance was afforded by the death of Maud Marsh, the third and last wife of Klosowski, the anti-mony poisoner. In this case, the medical men felt they had sufficient ground for informing the police before death occurred, though, unfortunately, it was then too late to save the woman. The circumstances attending the death of Bessie Taylor, the second wife, illustrate another type of difficulty. Here no suspicion of criminal poisoning seems to have been aroused, but the medical men were clearly much puzzled by the symptoms. During the course of the illness three consultations were held with specialists, one of whom suggested uterine disease, another thought the condition was due to severe hysteria, while the third diagnosed cancer of the stomach and intestines. Finally, in the certificate, intestinal obstruction, vomiting, and exhaustion were given as the cause of the death. In the case of the first wife, Mary Chapman, death was certified as due to phthisis, but at the exhumation no signs of disease were found in the lungs. Had the earlier cases been reported to the coroner, it is probable that the subsequent deaths would have been avoided.

These, and more recent instances which might be cited, show that sometimes medical practitioners will give a certificate, if they are satisfied that death was due to natural causes, even though they may be very uncertain of the underlying pathological cause. Such cases are indeed not rare, but to make certain of avoiding serious error it would be necessary to report cases, and extend the inquest system to a degree which the public would probably not tolerate. Undoubtedly, the difficulty would largely be met, if coroners were empowered to order a post-mortem before deciding to hold an inquest,

since the avoidance of unnecessary publicity would render doctors less reluctant to report doubtful cases. But this change in the law should be accompanied by one requiring every coroner to be a medical man, for the interpretation and assessing at its proper value of a medical report on an autopsy is not a duty which can properly be assigned to a layman.

While the Klosowski murders illustrate the risks run by the public under the present system, an interesting case, reported by Dr. Bateman, indicates the unpleasantness medical men may experience if they act on suspicion alone. A doctor suspected that attempts were being made to poison, by the administration of a narcotic, a lady whom he was attending. He had good reasons for not communicating his suspicions to the patient's brother or husband, and he did not know any other relative or confidential friend to whom he could go. He, therefore, wrote to his patient's solicitors, who were transacting business for her at the time, placing the facts before them, and marking his letter "private and confidential." The solicitors, however, when sending in their bill of costs to the patient, included the cost of writing to the doctor, and this led the brother to enquire into the nature of the letter, and subsequently to bring an action for libel against the medical man. A verdict was returned for the plaintiff with damages of one farthing.

The present position as regards giving information of deaths from doubtful causes is far from satisfactory, either to the public or the profession. It is to be hoped that changes, such as I have suggested, will be included in the long-promised Bill to amend the Coroner's Act, the introduction of which may possibly be hastened by the revelations in the recent "brides" case.

There are various other occasions arising in medical practice, in regard to which the duty of the doctor to give information to others is universally recognized. For instance, in a case of severe melancholia, it is clearly right to warn the relatives of the possibility of suicide. Secret alcoholism, drug habits, and threatened insanity may justify a similar course. It is true that in these cases information should, if possible, be given only to the responsible relative, but in some instances circumstances may compel that the communi-

cation should be made to others than relatives. In these cases, the communication being made for the benefit of the patient, the duty is unquestionable.

THE NECESSITY FOR DEFINING THE LIMITS OF PROFESSIONAL SECRECY.

The foregoing considerations show that the rule of professional secrecy, as enunciated by the defence society, is too comprehensive. Exceptions must be admitted, and for practical purposes we are driven to adopt some such form as that forming part of the celebrated oath of Hippocrates, which runs: "and whatever I hear in the course of my practice relating to the affairs of life of my patients *that ought to remain secret*, nobody shall ever know of me." The Scottish Universities have followed this precedent in the declaration they require from graduates in medicine, viz., "I will keep silence as to anything I have seen or heard while visiting the sick which it would be improper to divulge." It is desirable to emphasize the fact that there are distinct limits to the rule of professional secrecy, since insistence upon the larger view has sometimes led the profession into making claims which are difficult to justify. For example, opposition was made to stating the nature of an illness in medical certificates for sickness benefit under the Insurance Act, on the ground that it involved breach of professional secrecy. But it is obvious that since the certificate is given to the applicant, who can use it or not as he pleases, there is no violation of confidence whatever. Again, a well-known medical journal, in a leading article, recently urged the medical profession to oppose the extension of the Notification of Births Act entirely on the ground that it compelled the doctor to divulge information gained at the bedside. This is true, but to what does it amount in actual practice? In the first place, concealment of birth is a crime, the birth in any case must be registered, and it is exceedingly improbable that there are not other persons in the house, who know that the birth has occurred; hence, there is no "secret" to be safeguarded. Secondly, it is only in the case of an unmarried woman that the patient herself is likely to have any desire that the birth should not be notified, and, when it is remembered that illegitimate births form only about 4 per cent. of all births, and that the great majority of

these are attended in infirmaries or by midwives, the objection, on the ground of professional secrecy, to notifying an event which must, in any case, become known a little later, is too trivial for serious consideration. It is not within the scope of my subject to discuss whether the doctor should receive a fee for notification or not, but it may be pointed out that an unreasonable claim in one direction tends to weaken other claims which may have stronger justification.

COMMUNICATIONS REGARDING VENEREAL DISEASE.

We have now to consider the occasions which, apart from crime and from the statutory and moral obligations already discussed, are proper for the divulgence of professional knowledge, and, in conjunction with these, it will be convenient to examine the legal position of the medical man who makes the communication. These occasions fall into two groups: those which are prejudicial to the patient, inasmuch as they affect his or her moral reputation, and those which may prejudice his material interests as showing that he is unfit for his occupation. In practice, the first group relates chiefly to questions such as venereal disease, pregnancy, and abortion, and the second to persons occupying positions in which they are responsible for the public safety, both subjecting the practitioner to the dilemma of having to distinguish between his duty to the public, or to other persons, and his obligation to safeguard his patient.

As regards venereal disease, the question of breaking secrecy arises when a person is found to be suffering from syphilis or gonorrhœa, and the circumstances are such that there is serious risk of the disease being conveyed to others. It is now recognized that vigorous efforts must be made if the ravages of syphilis in the community are to be reduced, and every practitioner is aware of the importance of arresting at once the development of a long series of infections among innocent people. Every case will call for the exercise of discretion. When the patient is a reasonable person, who appreciates the danger to which he subjects others and can be relied upon to exercise precaution, action is rarely necessary. But all patients are not so amenable; there is the married man who avers, as soon as the initial symptoms have

subsided, that danger of infection has disappeared ; there is the unmarried man who dares not propose postponement of marriage ; there is the nurse who cannot give up her livelihood ; there is the shop assistant or factory operative, perhaps engaged in glass-blowing or " shuttle trimming," who will not go on the sick list. Under these circumstances, many practitioners will feel that there is a moral obligation upon them to warn those likely to be infected, and it would appear that if they do so decide, they are protected from legal consequences, provided their action was reasonable and justified.

In the first place, the practitioner who considers that he should communicate his knowledge to another, must feel quite satisfied as to the accuracy of his diagnosis, and must be in a position to establish that accuracy should his diagnosis be questioned. The truth of a libellous imputation affords a complete answer to a civil action for damages, because the action is brought by the plaintiff to free his character from such imputation, which he cannot be entitled to do if the imputation is actually true. In a criminal indictment, however, besides the truth of the statement it must also be shown that it was for the public benefit that the matters complained of should be published.

But even if the practitioner has been wrong in his diagnosis, it does not follow that an action against him will succeed, for if the statements have been in good faith and without malice, they may be held to be privileged. " Privilege may exist where any person having an interest to protect, or having a legal, moral or social duty to perform makes a communication to another (each other having a corresponding interest or duty) in protection of his interest or in performance of his duty ; here, although the communication may contain matter that would ordinarily be actionable, yet it is not actionable if the communication is fairly and honestly made in *bonâ fide* belief of its truth and without any gross exaggeration."¹ In any case in which privilege is claimed, it is for the judge to decide whether the principle can be applied in the particular case.

As a guide to the extent to which the general principle applies to the specific case of statements imputing venereal

¹ Indermaur : *Principles of the Common Law*.

disease, we have the extremely interesting case of *Guy v. Green* at the Leeds Assizes in 1902. In this case, the defendant, a medical man, was called in to attend the plaintiff, who was a barmaid at an hotel, and was requested by the manageress to see her. As a result of his examination, he informed the housekeeper and the employer that the girl was suffering from venereal disease. Subsequently, he made a similar statement to a man who represented himself to be the husband of the plaintiff, though this was shown later not to be the case. It was alleged that he had also made a communication to another barmaid, but this the defendant denied. At the hearing of the case, the judge ruled that the communications to the manageress, to the employer, and to the man who represented himself to be the husband, were privileged; but left it to the jury to decide on the evidence as to the communication to the other barmaid, and they found a verdict for the plaintiff, with 75*l.* damages. This case shows that the social duty, upon which the privilege was held to be based, will be considered to exist in the case of a doctor communicating his belief of the presence of venereal disease to either husband or wife, or a person whom he has good reason to believe is husband or wife, and to those whose duty it is to protect persons in their employ. But, having made these communications, he has done all that is necessary to discharge his duty, and the communication to a fellow-worker is unnecessary, and therefore libellous if not true.

COMMUNICATIONS REGARDING PREGNANCY.

On the question of pregnancy of an improper character, not much need be said. The issues raised are almost entirely of a private and personal character, and it is very rarely that a public duty exists, such as may justify communications relating to venereal disease. It may be said, therefore, that breach of confidence is only permissible under most exceptional circumstances. Privilege in regard to a statement of this kind made to a brother-in-law of the defendant was claimed in the case of *Kitson v. Playfair*, but was not admitted. The details of these cases are so well known that they need not be recapitulated. As an example of the type of case in which legitimate doubt might be felt as to the right course of action,

I may quote a case described in the defence society's report previously mentioned. A young woman became pregnant before she was 16 years old. She would not tell her mother who the man was, who had rendered himself liable to prosecution, but she told the doctor. The advice of the society was this was not a case for communicating the information without the patient's consent. But many medical men would feel that the possibility of bringing about a marriage between the girl and her seducer, and thus righting some of the wrong done to her, would justify revealing the facts. This, however, raises the question whether the man was already married, or whether on other grounds it was undesirable that a marriage should take place, all of which questions are more appropriate for investigation by the mother than by the doctor. Something, too, depends upon the age of the girl. I recall a case, in my student days, of a child of 13, who came into hospital in order to have labour induced, but here no efforts of the doctors or nurses could persuade her to name the person responsible for her condition.

While on this subject, I may refer to the oft-mentioned case of a mistress who requests a doctor to examine a servant, in order to determine whether she is pregnant. In such a case, it cannot be stated too strongly that action on the part of the doctor is entirely unwarranted, unless the purpose of the examination has been made perfectly clear to the girl, and she consents freely to it, in writing, as well as to the communication to the mistress of the result of the examination.

COMMUNICATIONS REGARDING UNFITNESS FOR DUTY.

The cases, which turn on unfitness for duty, relate to persons engaged in occupations upon which the lives of others may depend, who, having consulted a doctor privately, are found to be suffering from some condition which might incapacitate them at any moment. The driver of an express train or the keeper of a lighthouse is found to be suffering from epilepsy or serious cardiac disease. Some years ago, a statesman, occupying a position of high responsibility, committed acts of grave political indiscretion before it was recognized that he was suffering from G.P.I., a condition from which eventually he died. In the case of employed persons, the best plan is to persuade the patient to report himself to the

doctor appointed by the employing authority or to the authority itself. In the event of his refusing to do this, no general rule can be laid down, each case calling for individual consideration upon its merits. Instances are not rare in which doctors have felt it incumbent upon them under these circumstances to take steps for the safety of the public, but, though actions at law have often been threatened, very few have come into court. The case of *Still v. Morris* (Q.B.D. 1900) is important in this connection, though it should be noticed that here the doctor held an official position. A fireman, in the service of the Metropolitan Fire Brigade, claimed damages for negligence and libel against the defendant. The latter, who was the district medical officer, had treated the plaintiff for venereal disease, and had given a certificate to that effect to the Brigade, in consequence of which the plaintiff was dismissed. Counsel for the defence quoted one of the conditions of service, which ran: "Every fireman is liable to immediate dismissal for unfitness, negligence, or misconduct." The jury stopped the case, and returned a verdict for the defendant.

COMMUNICATIONS RELATING TO CRIME.

There is a general obligation upon every member of the community to render reasonable assistance in the repression of serious crime, but where a doctor is concerned, it is only in regard to very grave offences that this obligation can be held to override that of maintaining professional secrecy. Abortion and murder cover the great majority of the cases in which a medical man is obliged to consider whether he should give information to the police. In a case of criminal abortion, when the woman is recovering, medical men are certainly justified in acting upon the strongly expressed opinion of the late Mr. Justice Hawkins in *Kitson v. Playfair*. The learned judge considered that it would be "monstrous cruelty" for a medical man to inform the police after he had treated a woman for the effects of criminal abortion induced by herself or her sister, "for the purpose of saving her character, her reputation, or it might be her very means of livelihood." The same view may be taken to hold good, even if the act has been committed by a paid abortionist; though, under these circumstances, a medical man has sometimes given information to the police that a certain person has performed an illegal operation upon one of

his patients, but without divulging the specific case or the patient's name.

If the woman is likely to die, and the crime thus become the more serious one of murder, it has been held, up to the present, that the doctor should inform the police in order that her depositions may be taken. The Royal College of Physicians has, however, recently published a report on this question in which the following opinions are expressed:—

“That a moral obligation rests upon every medical practitioner to respect the confidence of his patient; and that without her consent he is not justified in disclosing information obtained in the course of his professional attendance on her.”

“That every medical practitioner, who is convinced that criminal abortion has been practised on his patient, should urge her, especially when she is likely to die, to make a statement which may be taken as evidence against the person who has performed the operation, provided always that her chances of recovery are not thereby prejudiced.”

“That in the event of her refusal to make such a statement, he is under no legal obligation (so the College is advised) to take further action, but he should continue to attend the patient to the best of his ability.”

“That if the patient should die, he should refuse to give a certificate of the cause of death, and should communicate with the coroner.”

This is a remarkable pronouncement, which is not in accord with generally observed practice. It will be noted that the professional confidence is not respected, since information is to be given to the coroner, who must hold an inquest, and thus the circumstances will become widely known. The only person who benefits by the withholding of information when the woman is dying, is the criminal, since what may be the most valuable evidence against him is lost for ever. There is the further possibility that by keeping silence until this evidence is destroyed, the doctor may bring suspicion against himself. This utterance of the College is merely an expression of opinion, which is not necessarily binding upon members and fellows, and there are certainly occasions on which medical practitioners would be exceedingly unwise to follow it, on personal, apart from public, considerations.

With regard to the crime of murder or grave assault,

Mr. Justice Hawkins said also in the case of *Kitson v. Playfair* "There might be cases when it was the obvious duty of the medical man to speak out. In a case of murder, for instance. A man might come with a wound which it might be supposed had been inflicted on him in the course of a deadly scuffle. It would be a monstrous thing if the medical man might screen him and try to hide the wound which might be the means of connecting the man with a serious crime." Here again the right course to take depends on circumstances. If a person came to the surgery, who was recognized as being "wanted" for murder, he should undoubtedly be detained while the police are sent for, and he can be arrested. On the other hand, if a medical man, practising in a low class neighbourhood, were to report every case of a black eye or injured scalp, though admittedly incurred in a public house brawl, he would very soon be made to feel that he was not a friend of the people, and this probably not least by the injured persons themselves. Child-murder by the mother requires special consideration. It is a crime of which a doctor not unfrequently becomes aware, and it is often committed under circumstances which cannot fail to elicit sympathy, the effect of which is seen in the efforts which are always made to deal leniently with these cases in court. Doctors also are sometimes informed by the police that the dead body of an infant has been found under circumstances indicating murder, and are asked to communicate immediately with the police, if they are called to attend a woman who has been recently confined and might have been concerned in the crime. My own view of such cases is that it is no part of the doctor's duty to act as a detective, that he should ask no questions other than those necessary for the conduct of the case, and that he should not report circumstances which are merely suspicious. But if a confession is voluntarily made to him, or if he finds the body of the child and sees clearly that it has been murdered, then his duty as a citizen to help in repressing serious crime overrides his purely personal obligation to his patient.

PROFESSIONAL SECRECY AND HOSPITAL PATIENTS.

It should be noticed that the general obligation to observe professional secrecy applies with equal force to patients

treated in hospitals or poor law infirmaries as to private patients. It is probably in connection with claims for compensation or damages that the question most frequently arises, an employer or insurance company writing for information regarding the injured person. In such cases, the medical officer of the institution has no right to give information or make any report on the condition of the patient without the clearly expressed consent of the patient, nor should he permit an examination of the patient to be made, without consent, by a medical man acting on behalf of an outside body. The excellent rule has now been laid down at St. Bartholomew's Hospital, that all applications for reports must be referred to the clerk of the hospital, who will see that the request is properly authorized, and the patient's consent duly obtained.

PROFESSIONAL SECRECY IN THE WITNESS-BOX.

In the witness-box, a medical man cannot refuse to answer any question save one which tends to incriminate himself, but when the answer is one which involves revealing a professional confidence in a matter detrimental to his patient's honour, the custom is well recognized of appealing to the judge as to the necessity of answering the question or of asking permission to write down the answer and hand it to counsel.

In the foregoing summary, I have dealt with many matters which cannot be settled either by rule of law or by moral principle. The individual cases, as they arise, must be determined by each practitioner according to the dictates of his conscience, and to decide the right course is sometimes among the most difficult problems of medical practice. The obligation of professional secrecy has the sound basis that its observance alone can secure that confidence between patient and doctor, which is essential in the best interests of the patient himself, and any undue weakening of this obligation would be viewed with dismay both by profession and public. On the other hand, everyone owes a duty to the community of which he forms part, and where the law commands, or where moral sanction is strong, personal and private interests must be relegated to the second place.



ARRANGEMENTS FOR THE FORTHCOMING SESSION.

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ST. BARTHOLOMEW'S HOSPITAL AND MEDICAL SCHOOL, E.C.

THE Medical School in all its departments will be carried on as usual during the Academical Year beginning October 1st, 1915. In some of the departments, the teaching staff has been reduced owing to circumstances arising out of the War, or the temporary absence of some of the staff with the Army in France. In no department, however, will the temporary absence of members of the staff in any way interfere with the education of the students. It is fully recognized that the present excessive call upon young qualified medical men to supply the needs of the Navy and Army can only be met by keeping up a constant stream of newly qualified men, and arrangements, therefore, have been made at St. Bartholomew's to enable students to go through their curriculum as quickly as is consistent with the requirements of an efficient training.

Although the hospital staff forms the staff of the 1st London General Hospital for wounded at Camberwell, these additional duties in no way interfere with their teaching work in the wards and out-patient rooms at St. Bartholomew's Hospital. There are, however, a few alterations of a temporary character. The number of days weekly on which out-patient clinical classes are held in some of the special departments has been curtailed. In the wards, Dr. J. H. Drysdale is acting as physician in place of Sir Wilmot Herringham who is consulting physician to the Army in France; Mr. L. B. Rawling is acting as surgeon in place of Sir Anthony Bowlby who is consulting surgeon to the Army in France; Dr. Hartley is taking Dr. Tooth's duty as physician during Dr. Tooth's absence as Commanding Officer to the 1st London General Hospital at Camberwell. Dr. Hinds Howell and Dr. Feiling are acting temporarily as assistant physicians, and Mr. H. Blakeway and Mr. K. J. A. Davis as assistant surgeons.

Professor F. A. Bainbridge has recently been appointed to take charge of the department of physiology in place of Dr. J. S. Ekins who resigned last year.

It has been found necessary to reduce the numbers of the resident hospital staff and arrangements have been made by which house surgeons and other members of the junior staff may receive temporary honorary commissions in the

ST. BARTHOLOMEW'S HOSPITAL AND MEDICAL SCHOOL—(cont.)

R.A.M.C. and after serving for three months on the resident staff of St. Bartholomew's may be called up for duty with the Army either at home or abroad. Nearly 1,000 old St. Bartholomew's men are serving in the Naval, Army or Indian Medical Departments, or are otherwise employed with the Forces.

All the students' appointments of dresser, clinical clerk to in- and out-patients and of dresser or clerk in the various special departments will be made as usual.

The annual dinner of old students, generally held on October 1st in the Great Hall of the Hospital, will not take place this year.

CHARING CROSS HOSPITAL AND MEDICAL SCHOOL, W.C.

AT this School of Medicine, the courses of instruction are framed primarily to meet the requirements of the London University, but they also satisfy those of any other British University or College. The Hospital, with its convalescent home, contains over 300 beds. The School is situated in central London, and contains pathological and bacteriological laboratories, pharmacological, materia medica, and public health laboratories. Clinical instruction is given in medicine, surgery, and obstetrics, and, in the special departments: diseases of skin, diseases of children, mental disorders, the eye, nose, throat, and ear, and in the orthopædic, Röntgen, and electrical departments.

By arrangement with the University of London all students for the Primary and Intermediate portions of the curriculum carry out the necessary courses of instruction at King's College Laboratories, situated within a few minutes' walk of the Hospital. The entire teaching of the School is devoted to pathological, bacteriological, and other subjects of final studies.

The new Session will begin on Friday, October 1st.

ST. GEORGE'S HOSPITAL AND MEDICAL SCHOOL, S.W.

THE new Session will be held as usual, and the full curriculum for the various examining bodies will be pursued.

ST. GEORGE'S HOSPITAL AND MEDICAL SCHOOL—(cont.)

It is not anticipated that the War will make any difference in the courses of lectures, except in so far as refers to those gentlemen who are now on active service and whose lectures, of course, will have to be given by their colleagues still in the Hospital. Although the existing staff are all in Naval or Military employ, the great majority have to give part-time services in connection with the 4th London General Hospital, and are, therefore, available to hold classes in the School.

The only alteration which it is proposed to make is in the cancelling of any festivities such as the inaugural address and the annual dinner on the 1st October.

A student may become a member of the School at any time, but is advised to do so in May or October.

A student in the first, second, or third year of his studies should call upon the Dean, bringing with him a certificate of having passed a recognized preliminary examination. He then signs the Register of Students, and becomes enrolled without the payment of an entrance fee. He has the option of prosecuting the preliminary or intermediate portions of his studies either at University College or at King's College. While he is at one or other college he is under the supervision of the Dean of St. George's Hospital. When he has passed his second examination, he returns to St. George's Hospital for the clinical portion of the curriculum. As he is a St. George's student from the commencement of his studies, he is exempted from the entrance fee of 10*l.* 10*s.*, payable by those who enter for clinical work only.

A student in the fourth or fifth year of the curriculum can become a member of the school for the prosecution of his clinical studies, as required by the regulations of the final examinations of the various licensing bodies, and for certain examinations in advanced anatomy and physiology, by calling upon the Dean, signing the Register of Students, and paying an entrance fee of 10*l.* 10*s.*

Qualified medical men, not being St. George's men, who are desirous of attending the hospital practice of St. George's are admitted as Post-Graduate Students.

GUY'S HOSPITAL AND MEDICAL SCHOOL, S.E.

THIS Hospital, founded by Thomas Guy in 1724 for the

GUY'S HOSPITAL AND MEDICAL SCHOOL—(cont.)

reception of 400 patients, and enlarged through the aid of a large bequest from the late William Hunt, contains at the present time 643 beds.

The school buildings have recently been rebuilt, and now offer very complete accommodation. The following table shows the dates at which the present buildings were completed :—

The Wills Library in 1903.

„ Department of Anatomy in 1904.

„ Gordon Museum in 1905.

„ Department of Biology in 1905.

„ Departments of Chemistry and Physics in 1910.

„ Department of Physiology in 1910.

„ Departments of Pathology and Pharmacology in 1912.

Within the grounds of the Hospital are situated the Residential College, with accommodation for 60 students; the students' club, with reading, smoking, luncheon and dining rooms, a fives court, and swimming bath. The athletic ground and club house is situated at Honor Oak Park, and can be reached in 20 minutes from the Hospital.

House physicians, house surgeons, out-patient officers, assistant house surgeons, obstetric residents, ophthalmic house surgeons, clinical assistants, clerks to anæsthetists, surgeons' and assistant surgeons' dressers, surgical and medical clinical clerks, post-mortem clerks, extern obstetric attendants, and dressers and clerks in the special departments, are appointed from among the students, upon the recommendation of the Medical Council, according to merit.

The new Session will open on the 1st October, informally and without inaugural ceremony of any sort.

Although a very large number of teachers in the medical school have undertaken duties in connection with the War, and have received leave of absence from the school, in every case appointments have been made to the vacancies thus created, and it has not been found necessary to omit any undergraduate course of instruction. The importance of continuing the supply of medical men during the present emergency has forced the school to spare no effort to carry on its work without change.

KING'S COLLEGE HOSPITAL AND MEDICAL SCHOOL.

THE New Buildings of the Medical School, designed by Mr. W. A. Pite, F.R.I.B.A., will be open for the coming Session, which will begin on October 1st. The classrooms, library, lecture theatre, pathological laboratory, common room, etc. contained therein are all of a fine description, and possess all the latest improvements in construction, lighting, heating and apparatus. The buildings are directly connected with the wards of the Hospital, and with the operating theatres and post-mortem room.

The Preliminary Medical Studies of the students of the School will be carried on as usual at King's College, London.

Advanced or Final Studies.—In spite of the absence of a few members of the teaching staff on Military Service in France and at the Dardenelles, arrangements have been made to carry on the curriculum of the school with the same high standard of efficiency as prevailed before the outbreak of the War.

(a) *Lectures* will be given in all the subjects required for examinations. The following are some of the lectures which have been already arranged :—

Dr. Dalton	}	-	-	Medicine.
Dr. Crawford				
Dr. Briscoe				
Dr. Aldren Turner	-	-	-	Neuropathology.
Dr. Tunnicliffe	-	-	-	Therapeutics.
Professor Carless	-	-	-	Surgery.
Professor Phillips	-	-	-	Obstetric Medicine.
Dr. Hugh Playfair	-	-	-	Gynæcology.
Professor Sir St.Clair Thomson				Laryngology.
Mr. L. V. Cargill	-	-	-	Ophthalmology.
Mr. Arthur Cheatle	-	-	-	Otology.
Professor Whitfield	-	-	-	Dermatology.
Professor Still	-	-	-	Diseases of Children.
Dr. Silk	-	-	-	Anæsthetics.

(b) *Practical Instruction* will be given in the laboratories ; and the Pathological Museum (to which new and rare specimens are being frequently added) will remain open.

(c) *Clinical Instruction* will be given in the wards by the

KING'S COLLEGE HOSPITAL AND MEDICAL SCHOOL—(cont.)

physicians and surgeons of the Hospital.

(d) *The Special Departments* for diseases of women and children, and for eye, ear, throat and nose, skin, teeth, and radiography will be carried on.

Resident Appointments.—A large number of resident appointments will be available after the termination of the War, and students commencing their advanced medical studies now will, in the ordinary course, be eligible as candidates for these.

LONDON HOSPITAL MEDICAL COLLEGE AND DENTAL SCHOOL, E.

THE new Session will open on October 4th and lectures, classes and demonstrations will begin as usual.

The Examinations for the entrance scholarships will begin on September 21st in the College Library. Candidates should send in their names by September 20th to the Dean.

The Hospital has 922 beds in constant use. It is the only general hospital for East London.

18,310 in-patients and 170,491 out-patients received treatment last year, while not less than 6,494 major operations were performed. The out-patients consisted of over 9,000 accident cases and 10,106 dental cases. To carry on the work of the Hospital, the following officers are in residence :—

2 accoucheurs, 6 house physicians, 6 house surgeons, 3 house surgeons to special departments, 7 receiving room officers, and 2 emergency officers. In the out-patient department the following officers attend daily :—2 medical clinical assistants, 2 surgical clinical assistants and 2 senior dressers, in addition to the clinical assistants in the various special departments. All of these appointments are filled from students of the college and hospital who have recently qualified. It will, therefore, be seen that exceptional opportunities are offered to students of the Hospital.

The medical college contains well-equipped laboratories, museums, classrooms and a library. Students are prepared for the examinations of the Universities, of the Royal Colleges of Surgeons and Physicians, and of the Apothecaries' Hall.

LONDON HOSPITAL MEDICAL COLLEGE AND DENTAL SCHOOL—(cont.)

Special facilities are also offered for the conduct of scientific research, and a fund of over 21,000*l.* is provided for this object.

The Dental School, which is fully equipped on the most modern lines, is specially adapted for the purpose of teaching, and provides a full course for the dental diplomas.

Scholarships and prizes to the value of over 640*l.* will be offered during the Session.

In connection with the Hospital there is a clubs' union, students' hostel, and an athletic ground of 13 acres.

ST. MARY'S HOSPITAL AND MEDICAL SCHOOL, W.

THE new Session will open on Friday, October 1st, when all lectures and classes will begin as usual.

Owing to the War, the annual dinner of past and present students will not be held.

During the past year it was found possible to carry on, without interruption, classes in preliminary, intermediate, and final subjects, covering the entire medical curriculum.

For the coming Session all the teachers of the preliminary and intermediate subjects, with one exception, are available. In spite of the absence abroad on military duty of numbers of the Hospital staff, arrangements have been made for all lectures and classes for the final subjects to be held as usual.

An examination for entrance scholarships in Natural Science will be held on September 20th, 21st, and 22nd.

MIDDLESEX HOSPITAL AND MEDICAL SCHOOL, W.

THE opening of the new Session, 1915-16, will take place on Friday, October 1st, at 3 o'clock. John Cameron, Esq., M.D., D.Sc., F.R.S.E., will deliver the opening address, after which the prizes gained during the past year will be distributed.

Owing to the War, there will be no annual dinner.

The lectures and classes will begin on Monday, October 4th.

The Hospital and Medical School are fully equipped for

MIDDLESEX HOSPITAL AND MEDICAL SCHOOL—(cont.)

the theoretical and practical teaching of all the subjects of the medical curriculum, and for the diplomas in public health. Ample laboratory and classroom accommodation is provided for the teaching of the various subjects, and for original research.

The Hospital contains 440 beds, including special wards for cancer cases, maternity and gynaecological cases, and for diseases of children and the skin and eye.

The Cancer Wing (containing 90 beds) and special research laboratories offer unrivalled opportunities for the study of cancer, both in its clinical and pathological aspects.

The Bland-Sutton Institute of Pathology.—This Institute, which is just completed, is under the charge of Dr. C. Browning, the Director. It contains a new lecture theatre, large laboratories for teaching purposes, and smaller rooms fully equipped for the carrying out of research work. In this Institute the bacteriological, clinical, and microscopical examinations of material from the wards, operating theatres, and out-patient rooms are carried out. Senior students are eligible to hold clerkships in this department, and every facility is given to those wishing to conduct original investigation.

The Museum, which is now part of the Institute, has been entirely rebuilt. It is under the charge of the Director, and contains a large series of specimens especially selected for teaching purposes.

In the *Electro-Therapeutical Department* special attention is given to the treatment of lupus and cancer by the X-rays, and opportunities are afforded to students wishing to become acquainted with the use of the apparatus employed in this method of treatment. An electro-cardiograph has recently been installed in this department.

The Reference Library is open to students of the Hospital and contains the latest medical text-books and the leading medical journals. *Hours*—9 a.m. to 5 p.m. Saturdays, 9 a.m. to 1 p.m.

The Museum of Materia Medica.—A complete collection of materia medica specimens has been arranged, in a manner most convenient for study, in a room specially fitted for

MIDDLESEX HOSPITAL AND MEDICAL SCHOOL—(cont.)

the purpose.

The Residential College has its frontage in the Hospital garden. It contains accommodation (residence and board) for a limited number of students. Application for rooms should be made to the Secretary-Superintendent of the hospital, who will furnish all information.

The Athletic Ground is situated at Park Royal, within easy distance from the Hospital. There is a *Gymnasium* within the precincts of the Hospital.

Students who begin their medical studies in April are eligible to compete for the entrance scholarships in the following September, and members of the Universities of Oxford and Cambridge joining the School in April are eligible to compete for the University entrance scholarship in the following September.

ST. THOMAS'S HOSPITAL AND MEDICAL SCHOOL, S.E.

THIS School, and the Hospital in connection with which it works, is situated in Lambeth, the joint buildings on the Thames facing the Houses of Parliament, and forming one of the well-known architectural features of London.

In spite of the distress caused by the War, the work of the Hospital continues as usual, and the next Session begins on October 4th. The ordinary civilian wards are full and in addition there are 530 beds in use for the treatment of soldiers from the front. The teaching has been specially arranged with a view to meeting all emergencies caused by the absence of a certain number of the members of the staff on War Office duties, but such arrangements have been made that all classes and teaching are continued. There is naturally a shortage of students, but the Hospital is fully prepared to meet the requirements which have been enumerated definitely and clearly by the War Office, that the Medical School should make every effort to train as many medical students as possible to meet the immediate necessities of the future.

The school buildings comprise numerous theatres, laboratories, and classrooms, well adapted for the teaching of large numbers of students in the subjects of the modern medical

ST. THOMAS'S HOSPITAL AND MEDICAL SCHOOL—(cont.)

curriculum. A splendid library and reading-room and a complete museum are open to all students from 9 a.m. to 5 p.m.; Saturdays, 2 p.m.

The club premises contain a dining-room and smoking and reading-rooms supplied with daily and illustrated weekly papers. Good meals are obtainable at a moderate tariff. A cloakroom with lockers and a lavatory with bathrooms are in the main school building. The terrace affords facilities for exercise and recreation. Students are thus able to spend the whole day at the school.

The sports ground, more than 9 acres in extent, is at Chiswick, and can be reached in 40 minutes from the Hospital. It is admirably adapted for football, cricket, lawn tennis, and athletic sports.

The Hospital normally contains 604 beds, but temporary huts have recently been erected between the blocks, and will accommodate 300 beds of the 530 beds reserved for wounded soldiers.

In addition to the ordinary provisions of a great hospital, there are connected with the out-patient department at St. Thomas's physicians' and surgeons' rooms provided with ample seating accommodation, so that large numbers of students are enabled to follow closely the practice and teaching of the out-patient staff. There is a full complement of special departments, and, connected with the Hospital, a special tuberculosis department gives opportunity for the instruction of students. The clinical theatre, situated in a central position, facilitates the illustration of lectures by patients from the wards and out-patient room; it is arranged also for lantern demonstrations.

The maternity ward, containing 20 beds, gives full facilities for maternity training, under supervision, within the precincts of the hospital, thus obviating any necessity for seeking instruction elsewhere, and fully preparing the student for the external maternity practice of the hospital district. The revised regulations of the examining bodies can thus be fully complied with.

Appointments.—All hospital appointments are open to students. A resident assistant physician and a resident

ST. THOMAS'S HOSPITAL AND MEDICAL SCHOOL—(cont.)

assistant surgeon are appointed annually at a salary of 150*l.* each, with board and lodging. Two hospital registrars at an annual salary of 150*l.* each, are appointed yearly. The tenure of these officers may be renewed for a term not exceeding two years. Eight resident casualty officers and anæsthetists are appointed every six months. An obstetric tutor and registrar is appointed each year at an annual salary of 50*l.* Four house physicians, four house surgeons, two obstetric house physicians, two ophthalmic house surgeons, and eight clinical assistants in the special departments are appointed every three months, and hold office for six months if recommended for re-election. Two research assistants (bacteriological and chemical) at salaries of 200*l.* per annum each. Clinical clerkships and dresserships to the in-patient and out-patient departments are available to the number of 400 each year.

Scholarships.—There are five entrance scholarships offered: Two in Arts, giving one year's free tuition; one of 150*l.* and one of 60*l.* in chemistry, physics, and biology, for students who have not received instruction in anatomy or physiology. One of 50*l.* in any two of the following subjects: anatomy, physiology, or chemistry, for students who have completed their examinations in anatomy and physiology for a medical degree in any of the universities of the United Kingdom, and have not entered as student in any London medical school.

Numerous scholarships, prizes and medals are open for competition throughout the whole career of a student, including a fellowship of 100*l.* given by the Salters' Company for research in pharmacology, and the Louis Jenner Research Scholarship of the annual value of 60*l.* for pathological research.

Fees.—The entrance fee for second year's students is 20 guineas; for third year's students 10 guineas. The annual composition fee is 30 guineas. For preliminary science students the fee is 15 guineas. The fees cover all tutorial classes given by the school teachers, and there are no extra charges made for materials required in practical courses.

Special courses of instruction are given for various examinations, and a register of lodgings is kept at the school.

UNIVERSITY COLLEGE HOSPITAL AND MEDICAL SCHOOL, W.C.

As far as the entry of full students is concerned, the War has had no effect. As a matter of fact, the present year is a record year for entries, and the new Session will begin on Monday, October 4th. The entry of part time students is much lower than in previous years. The pass lists of the various Examining Boards for degrees and diplomas testify to the high standard of teaching and the ability of the students. Over 200 of our recently qualified students hold commissions in the Army and Navy. Seventeen have been mentioned in despatches. Captain A. Martin-Leake has been awarded a bar to the V.C. awarded him during the South African War. Captain T. J. Crean, V.C., has been awarded the D.S.O. Lieutenants W. H. Lister and H. G. Janion have been awarded the Military Cross.

The Medical School comprises the departments of medicine and clinical medicine, surgery and clinical surgery, midwifery, and gynæcology, pathology and morbid anatomy and clinical pathology, cardiography, bacteriology, mental physiology and mental diseases, dental surgery, practical pharmacy, and other departments for the study of special diseases such as those of the eye, skin, ear, and throat, and for instruction in the use of anæsthetics, and in electro-therapeutics and the application of the X-rays. Scholarships, exhibitions, and prizes to the value of over 1,000*l.* are offered for competition every year.

Composition fees for the courses required by the University of London: For the final M.B., B.S. course, 80 guineas, or in two instalments of 50 and 32 guineas; for the medical education required by the Examining Board in England and the Society of Apothecaries, for the course required for the third examination, 80 guineas, or in two instalments of 50 and 32 guineas.

The National Dental Hospital and School has recently been taken over as the Dental Department of University College Hospital. All students joining the dental department will do so as students of University College Hospital. The fee for the complete dental curriculum is 180 guineas, or four annual instalments of 62, 41, 41, 41 guineas. Qualified medical men wishing to obtain the special dental diploma of the Royal College of Surgeons can be admitted for the

UNIVERSITY COLLEGE HOSPITAL AND MEDICAL SCHOOL—(cont.)

necessary two years' curriculum, including practical dental mechanics, operative work, and all the required dental lectures, for a fee of 120*l*.

WESTMINSTER HOSPITAL AND MEDICAL SCHOOL, S.W.

THE next Session of the Medical School will begin on October 1st. There will be no opening address, and, in consequence of the War, the customary dinner of the staff and students past and present will not be held. Two scholarships in anatomy and physiology, value 50*l*. each, are offered for competition, the examination for which will be held on September 23 and 24. Four members of the medical staff are serving with His Majesty's Forces in France and the Eastern Mediterranean.

ROYAL FREE HOSPITAL (AND SCHOOL OF MEDICINE) FOR WOMEN,
8, HUNTER STREET, BRUNSWICK SQUARE, W.C.

THE new Session will open on Friday, October 1st, and the inaugural address will be given by Dr. Florence Willey at 4 p.m. on that day. Students will attend at the school on Saturday morning, October 2nd, to see the lecturers in the various departments, and make the necessary arrangements for their work. Lectures and classes will begin on Monday, October 4th.

The extension of the school is in progress on a site fronting on Wakefield Street, adjoining the present building. It is hoped that it may be completed by February 1916. The new wing will include extension of the departments of anatomy, physiology, organic chemistry, and physics, research pathological laboratories, a students' union room, and some further cloak room accommodation.

The pathological department at the Royal Free Hospital has been rebuilt, and will be ready for the opening of the new Session.

Full courses in preparation for the M.B., B.S. Degrees of the University of London, for the Diplomas of the Royal Colleges (M.R.C.S., L.R.C.P.), for the primary fellowship examination, and for the qualifying examinations of other

ROYAL FREE HOSPITAL (AND SCHOOL OF MEDICINE) FOR WOMEN—(cont.)

bodies will begin in October.

The following Scholarships have been awarded for the courses beginning October, 1915 :—

Scholarship given by H.M. the Queen.—(50*l.* a year for five years.) Miss Vanda P. Thomas, Ladies' College, Cheltenham.

Rose Neville Scholarship.—(150*l.* a year for five years.) Miss K. Field, Newnham College, Cambridge.

St. Dunstan's Medical Exhibition.—(60*l.* a year for five years.) Miss P. M. Phillips, North London Collegiate School.

Isabel Thorne Scholarship.—(30*l.*) Miss D. M. Kemp, City of London Girls' School.

Mabel Sharman Crawford Scholarship.—(20*l.* a year for four years.) Miss N. D. O'Flynn, B.Sc., University College, Cardiff.

Ellen Walker Bursary.—(25*l.* a year for two years.) Miss E. M. Scarborough.

COLLEGE OF MEDICINE, NEWCASTLE-ON-TYNE.

THE work in the various departments of the University of Durham College of Medicine, Newcastle-upon-Tyne, will be carried on as usual.

THE UNIVERSITY, BIRMINGHAM.

THE University has made no special arrangements with regard to the medical school for the Session 1915-16, and the medical faculty will proceed with the usual courses for medical and dental degrees and diplomas as in previous years except so far as minor details are concerned, but the normal courses will all be carried out. It is possible, however, that the numbers in the school, which last October were reduced by about 25 per cent. on account of students taking commissions or enlisting in the Army and Navy, may be still further reduced. There will not, of course, be any special opening ceremony on Tuesday, October 5th, the day on which the work of the new Session will begin, and

THE UNIVERSITY, BIRMINGHAM—(cont.)

the usual conversazione on the opening day of the Session will *not* be held this year.

THE UNIVERSITY, LIVERPOOL

THE next Session begins on the 5th October, and arrangements have been made to carry on the ordinary work of the medical faculty without any modifications in classes or curriculum. Courses for the diplomas in tropical medicine and public health will be held as usual. The University has made alterations in ordinances in order that students in military service may receive special privileges when they return to their classes.

THE UNIVERSITY, MANCHESTER.

THE University of Manchester, the Manchester Royal Infirmary, and the other hospitals associated with the work of the medical school of the University offer exceptional facilities for the study of every branch of the science and practice of medicine and surgery. The scientific departments are well known for their efficient teaching as well as for their record of original research; and the hospitals, which serve a larger population than perhaps any others in the United Kingdom, afford special opportunities for training in clinical work.

The War has not affected the thoroughness of the training of the medical student; in fact, the conditions now prevailing afford the student greater opportunities for practical and clinical experience than in times of peace.

Special facilities are provided for research in every branch of medical study; and training for the degree and diploma in dental surgery, and the diplomas in public health, veterinary state medicine, and psychological medicine.

MANCHESTER CHILDREN'S HOSPITAL PENDLEBURY, GARTSIDE STREET, MANCHESTER

THE War will not affect the medical arrangements for the forthcoming Session.

THE UNIVERSITY, LEEDS.

SCHOOL OF MEDICINE.

ARRANGEMENTS have been made for carrying on the training of medical students with undiminished efficiency. The new Session will begin on October 1st, when the opening address will be delivered by Sir William Osler, Bart.

Candidates presenting themselves for matriculation in the Faculty of Medicine of the University, must pass an examination in English (language or literature), English history, mathematics, and three of nine optional subjects. Exemption from the matriculation examination is granted to graduates of any University in the United Kingdom.

Four degrees in Medicine and Surgery are conferred, viz., Bachelor of Medicine and Bachelor of Surgery, M.B. and Ch.B., Doctor of Medicine, M.D., Master of Surgery, Ch.M. Also degree and diplomas in dental surgery, and diplomas in public health, and psychological medicine.

DEGREES OF BACHELOR OF MEDICINE AND BACHELOR OF SURGERY.

Candidates must have attained the age of 21 years on the day of graduation, and must certify that they have attended courses of instruction approved by the University, extending over not less than five years, two of such years at least having been passed in the University subsequently to the date of passing the first examination.

Candidates must also satisfy the Examiners in the several subjects of the following examinations:—

The Matriculation Examination, or such other examination as may have been recognised by the Joint Matriculation Board, in its stead.

The First Examination,
The Second Examination, and
The Final Examination.

The First Examination.—The examination consists of—Part 1, physics and chemistry. Part 2, biology.

Candidates are allowed to pass in the two parts separately.

The Second Examination.—The examination consists of—

THE UNIVERSITY, LEEDS—(cont.)

Part 1, anatomy and physiology. Part 2, materia medica, and pharmacy.

Candidates are allowed to pass in the two parts separately.

The Final Examination.—The examination consists of—Part 1, pathology and bacteriology. Part 2, forensic medicine and public health. Part 3, medicine, systematic and clinical, including mental diseases and diseases of children. Surgery, systematic, clinical and practical. Obstetrics and gynæcology, systematic, clinical and practical. pharmacology and therapeutics.

Candidates are allowed to pass in the three parts separately or together. They may present themselves for examination in Part 1, at the end of the tenth term, and in Parts 2 and 3, at the end of the fifteenth term.

DEGREE OF DOCTOR OF MEDICINE.

Candidates for this degree must be graduates in medicine and surgery, of at least one year's standing. They are required to present a dissertation, and if this be accepted to pass an examination. Any candidate may be exempted from a part, or the whole of the examination, if the Board of the Faculty so decide.

DEGREE OF MASTER OF SURGERY.

Candidates for this degree must be graduates in medicine and surgery, of at least one year's standing.

The subjects of examination are as follows:—Surgical anatomy. Surgery. Operative surgery. Clinical surgery. Ophthalmology. Pathology and bacteriology.

DIPLOMA IN PUBLIC HEALTH.

Candidates for this Diploma must have held for at least 12 months, a registrable qualification in medicine, surgery, and midwifery, and must produce evidence of having attended an approved course of study in accordance with the regulations of the University.

The examination, which is written, oral, and practical, consists of: Part 1, chemistry and physics. Ætiology of

THE UNIVERSITY, LEEDS—(cont.)

disease. Bacteriology. Part 2, engineering. Sanitary law and administration. Sanitary reporting.

Candidates may present themselves for the two parts separately, but cannot pass in Part 2 until they have passed in Part 1.

Diploma in Psychological Medicine.—Candidates for this diploma must be graduates in medicine of at least one year's standing, and must present evidence of having attended an approved course of study in accordance with the regulations of the University.

The examination is written, oral, and practical, and consists of: Part 1, anatomy and physiology of the brain (human and comparative); morbid anatomy of the brain. Part 2, psychology, clinical psychiatry; asylum administration and the medico-legal aspects of insanity.

Candidates may present themselves for the two parts separately, but no candidate will be allowed to pass in Part 2 before he has passed in Part 1.

Clinical Instruction.—The Leeds General Infirmary (520 beds) in connection with the Medical Faculty is the centre for clinical teaching, but in addition, The Public Dispensary, The Hospital for Women and Children, The Fever Hospital, The Maternity Home and The West Riding Lunatic Asylum, are made use of by the Leeds Students.

THE UNIVERSITY, SHEFFIELD.

FACULTY OF MEDICINE.

DURING the coming Session the various lectures, demonstrations, and practical classes will be given as far as possible on the same lines as during the past year, with such slight alteration of hours as may, from time to time, be found necessary. Due notice will be given of any such changes. All clinical appointments will be continued as heretofore.

THE UNIVERSITY, BRISTOL.

So far as is known, everything will go on as usual during the forthcoming Session.

**UNIVERSITY COLLEGE OF S. WALES AND MONMOUTHSHIRE,
CARDIFF.**

THE Medical School in this College expects to open as usual in the first week of October, and hopes to carry on its various courses without any other variation than what may result from the numbers of students presenting themselves for admission to the various classes. Those teachers who have undertaken military obligations, are performing their new duties in this city, and consequently are able to keep in touch with their College departments.

The foundation stone of the new physiological buildings, which Sir William James Thomas is erecting at a cost of about 30,000*l.* and presenting to the College, was laid on August 12.

SWANSEA GENERAL AND EYE HOSPITAL.

Our procedure has not been altered.

LONDON SCHOOL OF TROPICAL MEDICINE.

THIS School is under the auspices of the Seamen's Hospital Society. Its buildings, laboratories, museum, library, etc., are within the grounds of the Branch Hospital, Royal Victoria and Albert Dock (station: Connaught Road, Great Eastern Railway), and excellent opportunities are afforded to students and others who may be desirous of studying diseases incidental to tropical climates before entering the Services or going abroad. In the hospitals of the Society are to be found cases of tropical disease such as may be met with in actual practice in the tropics.

There are three courses in the year, each lasting three months, beginning October 1st, January 15th, and May 1st respectively. The courses are so arranged as to equip men for the diploma in tropical medicine and hygiene granted by the University of Cambridge, the diploma in diseases and hygiene of the tropics granted by the Conjoint Board, and the M.D. of the University of London (Part VI.) tropical medicine. Advanced classes in entomology, protozoology, and helminthology are held each term by the respective teachers in those subjects. The laboratories, museum, and library are open all day, and clinical instruction

LONDON SCHOOL OF TROPICAL MEDICINE—(cont.)

is given daily in the wards of the hospitals. Certificates are granted after examination to those who complete a full course. Resident chambers are available for students. All qualified medical practitioners, students in the final year of their studies, and qualified veterinary surgeons may attend the course.

Women graduates are received as students. The Stanley Memorial Grant of about 55*l.*, and the Wandsworth Scholarship of about 370*l.*, for research work, are awarded annually.

The War does not affect the school as regards teaching, it being open as usual, but the number of students is considerably less. An average of about 50 per session is now reduced to an average of about 15.

LONDON SCHOOL OF CLINICAL MEDICINE (POST-GRADUATE).

THIS School, which is devoted exclusively to post-graduate study, has its headquarters at the "Dreadnought" Hospital, Greenwich. Affiliated to it for the purposes of teaching are the following institutions:—The Royal Waterloo Hospital for Children and Women, the Bethlem Royal Hospital, and the Miller General Hospital. At the "Dreadnought" Hospital, there are, in addition to the medical and surgical wards, special wards for the treatment of patients suffering from venereal disease, the medical and surgical forms of tuberculosis, diseases of the eye, ear, nose and throat. In addition there are unusual opportunities for practical instruction in operative surgery and pathology. Every variety of disease may be studied at the "Dreadnought" and the hospitals affiliated thereto.

In consequence of the War the School has been temporarily closed. A syllabus of the course of study, which takes place at ordinary times, may be obtained on application to the Secretary, P. Michelli, C.M.G., "Dreadnought" Hospital, Greenwich, S.E.

**WEST LONDON HOSPITAL AND POST-GRADUATE COLLEGE,
HAMMERSMITH.**

THE work of this institution is carried on at the West London Hospital, the first in London to devote its clinical

WEST LONDON HOSPITAL AND POST-GRADUATE COLLEGE, HAMMERSMITH—(cont.)

material solely to the instruction of qualified men. The college started in 1895, and the present building was opened in 1901; it is provided with lecture, reading, writing, and classrooms, and accommodation of all sorts for the convenience of post-graduate students. In the last five years the yearly entry has averaged over 220.

As for ward work, the students accompany the senior staff on their visits to the wards at 2.30 p.m. daily, and also go round with the resident medical officers in the morning. Out-patient work begins at 2.15 p.m. This department is large, and affords ample facilities for post-graduates to see and examine patients. There are the usual special departments dealing with diseases of the eye, ear, throat, nose, skin, orthopædic, X-ray work, electro-therapeutics, gynæcology, and mental diseases of children. Post-graduates are appointed to act as clinical assistants for three or six months. There is no charge to members of the college. Practical classes are held in medicine, general practical surgery, gastro-intestinal surgery, surgical diseases of children, and blood and urine analysis, cystoscopy, venereal diseases, tropical diseases, retinoscopy, ophthalmic operative surgery, and, when material is available, in operative surgery. The size of the classes is limited so as to ensure that each student shall have full opportunities of gaining experience in methods of examination and treatment.

Operations take place at 2 p.m. daily, the surgeons often availing themselves of the assistance of post-graduates, and in any case making arrangements so that they can readily see what is going on. The anæsthetists give instruction in the administration of different anæsthetics, including spinal analgesia, on the operating days, students being allowed to administer them under supervision, while special classes are held in each session.

The pathological laboratory is in charge of a pathologist who attends every day. In bacteriology and microscopy, special instruction is given on three mornings a week, the students working at other times under the general guidance of the pathologist.

Demonstrations are given every day in the morning by

WEST LONDON HOSPITAL AND POST-GRADUATE COLLEGE, HAMMERSMITH—(cont.)

the assistant physicians, assistant surgeons, and by the medical and surgical registrars in practical medicine and surgery. Lectures of a practical kind are given daily (except Saturday and Sunday) at 5 p.m.

The arrangements of the college may be said to be equally suited to those who are preparing themselves for examination for the higher degrees and diplomas, to the needs of officers in the different services on study leave, who attend in large numbers, and to those medical men in ordinary practice who desire to get themselves up to date in general medicine and surgery, or to make a special study of some particular branch of work. The college, it may be noted, is in a residential quarter, and there are plenty of good lodgings in its neighbourhood.

The fees are as follows: Hospital practice, including all ordinary demonstrations and lectures, 1*l.* 1*s.* for one week, 3*l.* 3*s.* for one month, 4*l.* 4*s.* for six weeks, 6*l.* 6*s.* for three months, 10*l.* 10*s.* for six months, 15*l.* 15*s.* for one year, and 30*l.* for a life ticket. Every year in August there is a special vacation class, lasting four weeks, for which the fee is 3*l.* 3*s.* Three months' instruction in the administration of anæsthetics costs 3*l.* 3*s.* Subscriptions for any course can be taken out from any date. The certificates of the school are recognized by the Admiralty, the War Office, the Colonial Office, the India Office, and the University of London (for higher degrees).

GREAT NORTHERN CENTRAL HOSPITAL, HOLLOWAY ROAD, N.

A CONSIDERABLE proportion of the honorary medical staff is now serving with the R.A.M.C. either at home, in France, or at the Dardanelles, and their duties are to a great extent being undertaken by those remaining at the Hospital. About 100 beds are occupied by wounded soldiers, extra accommodation having been provided to meet the emergency. As regards the resident staff, for some time after the outbreak of the War the Hospital was fortunate in keeping the six resident appointments filled, but great difficulty is now being experienced in obtaining house physicians and house surgeons, there being several vacancies at the present time, and a number of local practitioners have come to the assist-

GREAT NORTHERN CENTRAL HOSPITAL, HOLLOWAY ROAD—(cont.)

ance of the committee. One after another of the residents have been called up by the R.A.M.C. even before their term of office was completed in many cases.

**PRINCE OF WALES GENERAL HOSPITAL (NORTH-EAST LONDON
POST-GRADUATE COLLEGE), TOTTENHAM, N.**

THE work of the Post-graduate School, which is in connection with the Prince of Wales General Hospital, Tottenham, N., will be carried on during the ensuing Session with certain alterations in the *personnel* of the teaching staff and some limitations in scope arising out of the War. There will be no formal opening lecture, but the full work of the School, subject to the above proviso, will begin early in October. Cliniques, lectures, and demonstrations will be arranged in all, or most, of the following subjects:—General medicine, surgery, and gynæcology; diseases of the eye, ear, throat, nose, and skin; fevers, psychological medicine, radiography, and medical electricity; bacteriology, clinical pathology, and vaccine therapy. The fee for three months in all departments is 3 guineas (one month 2 guineas or three months in one department 1 guinea); for the perpetual ticket, 10 guineas.

HOSPITAL FOR EPILEPSY AND PARALYSIS, MAIDA VALE, W.

BOTH in-patient and out-patient departments of this Hospital are open free to students and medical graduates. Owing to the War, no courses of instruction have been arranged at present, but as soon as they are decided upon particulars will be circulated.

**WEST END HOSPITAL FOR DISEASES OF THE NERVOUS
SYSTEM, 73, WELBECK STREET, W.**

OWING to the War, demonstrations by the physicians have been discontinued for the present.

Otherwise, the work of the Hospital is being carried out so far as possible as usual. Though there is a considerable shortage in the medical staff, clinical instruction continues to be given in the wards to students and post-graduates.

BETHLEM ROYAL HOSPITAL, S.E.

THIS Hospital is open for the admission of two resident house physicians who have recently obtained their diplomas to practise medicine and surgery. They are permitted to reside in the Hospital for a term not generally exceeding six months, beginning May 1st and November 1st, and are provided with apartments, complete board, attendance, laundry, and a salary at the rate of £100 per annum. They are under the direction of the medical superintendent, and are elected by the committee from candidates whose testimonials appear to be most satisfactory. The students of certain specified London medical schools receive clinical instruction in the wards of the Hospital, and qualified practitioners and other students may attend for a period of three months on payment of a fee.

HOSPITAL FOR CONSUMPTION AND DISEASES OF THE CHEST, BROMPTON, S.W.

THE courses of instruction at the Brompton Hospital for Consumption are recognized by the various examining bodies, and may be taken as part of the curriculum for the final examination in medicine. The School, however, is chiefly attended by post-graduates who desire to take advantage of the wide clinical field for the special study of diseases of the heart and lungs, or to pursue pathological research. The physicians give instruction daily during their visits to the wards and the assistant physicians daily in the out-patient department. Instruction is also given in the throat department and in the radiographic room. The superintendent of the pathological laboratories arranges for courses of instruction as they are required, and also for research under his supervision.

In times of peace, courses of lectures and demonstrations on diseases of the chest are arranged, but this year, owing to the War, the demand does not seem likely to arise; consequently, no special programme has been drawn up.

House physicians and clinical assistants are appointed on the recommendation of the medical committee for periods of six months. The holding of these appointments is an advantage to those who aim at specializing for work at tuber-

HOSPITAL FOR CONSUMPTION AND DISEASES OF THE CHEST, BROMPTON—(cont.)

culosis dispensaries or other work connected with the campaign against tuberculosis.

There are more than 300 beds in constant occupation at the Hospital and 150 at the Frimley Sanatorium.

Fees for clinical practice, one guinea for one month, two guineas for three months, five guineas for a perpetual ticket.

**CITY OF LONDON HOSPITAL FOR DISEASES OF THE
CHEST, VICTORIA PARK, E.**

OWING to the War, it is most unlikely there will be any post-graduate classes this autumn.

**ROYAL HOSPITAL FOR DISEASES OF THE CHEST, AND
MEDICAL SCHOOL, CITY ROAD, E.C.**

OWING to the pressure of War work, no fixed course of lectures has been arranged for the Autumn Session, but the clinical practice in connection with the various departments of the Hospital will be open to medical practitioners and students for the study of all diseases of the chest. The in-patient beds of the Hospital are occupied entirely by sick and wounded soldiers, many of whom are suffering from diseases of the chest, but the work of the out-patient departments, including that of the tuberculosis dispensary, is carried on as before.

VARIOUS DEPARTMENTS.

In-patient Department.

Out-patient „

Tuberculosis „

Laryngological „

X-ray „

Dental „

Bacteriological and Pathological Laboratories.

**MOUNT VERNON HOSPITAL FOR CONSUMPTION,
NORTHWOOD, MIDDLESEX.**

It has not been found possible, owing to the War, to make any school arrangements this year.

QUEEN CHARLOTTE'S LYING-IN HOSPITAL, MARYLEBONE
ROAD, N.W.

It is not proposed to make any drastic alterations because of the War.

Qualified medical practitioners are admitted to the practice of the Hospital. The usual course is one of four weeks, the fee for which is 8*l.* 8*s.*, but they may be admitted for a course of two weeks for a fee of 5*l.* 5*s.* They must make written application to the secretary, and produce their diploma or certificate unless registered. 1*l.* 1*s.* of the fee (as registration fee) must be paid as soon as the application is approved and the balance before entering on the duties.

The new residential college is at No. 5, Cosway Street, N.W., opposite the Hospital, with which it is in telephonic communication. Terms:—Full board, residence, and attendance, 30*s.* per week. Application to be made to the secretary.

They must devote their whole time to their duties at this Hospital, and must undertake not to attend any medical or surgical case outside the Hospital, or post-mortem examination.

They shall act under the direction of the physicians, and, in their absence, of the resident medical officers. When sent for they must attend at once.

They shall visit the wards with the physicians and with the resident medical officers during their daily rounds, and at other times when summoned.

While in the labour wards they shall, in the absence of the resident medical officers, act under the directions of the sister-midwife.

They will not be allowed to make a vaginal examination until they have disinfected their hands according to the prescribed regulations and to the satisfaction of the resident medical officers, or the sister-midwife-in-charge.

They shall always wear the overalls provided while in the labour wards.

They shall not perform any obstetric operation without the permission of one of the physicians or resident medical officers.

They shall sign the book of attendance on entry and

QUEEN CHARLOTTE'S LYING-IN HOSPITAL, MARYLEBONE ROAD—(cont.)

departure from the labour ward.

Each qualified medical practitioner shall keep a full record of each case assigned to him, on the prescribed form.

Each qualified medical practitioner, provided his duties have been satisfactorily performed, shall receive a certificate, signed by the physicians, stating the period of his attendance and the number of cases at which he was present at birth.

Medical students shall make written application to the secretary, which must be accompanied by a certificate on a form provided by the Hospital. In the case of students of a medical school, the form must be signed by the Warden or Dean.

The period of attendance shall be for not less than four weeks (except as below*), and students shall be admitted on the first and third Mondays of each month, as far as possible.

The fee for the course of four weeks is 8*l.* 8*s.*, one guinea of which as registration fee must be paid as soon as the application is approved by the visitors, or the name cannot be registered. Students must pay the balance of the fee before entering upon their duties. In event of failure to keep the engagement, the registration fee will be forfeited.

* Students who have completed a course of practical midwifery at their own hospital (either in the maternity ward or on the district), or who give satisfactory assurance that they are about to do so, may be admitted for the shorter period of two weeks at a fee of 5*l.* 5*s.* No certificate will, however, be given to such students until they have completed their ordinary hospital course.

THE HOSPITAL FOR WOMEN, SOHO SQUARE, W.

IN connection with the out-patient department there has been for some years a well organized clinical department. To meet the want increasingly felt by medical practitioners of a more intimate knowledge of the diseases peculiar to women, and of more extended opportunities for examining gynæcological cases, clinical assistants are appointed to the gynæcologists to out-patients. The appointments are open to qualified medical men and women.

The Hospital contains 67 beds. In the out-patient depart-

THE HOSPITAL FOR WOMEN, SOHO SQUARE—(cont.)

ment there are generally 3,000 or 4,000 new cases during the year, the total number of out-patient attendances being from 12,000 to 16,000.

This large number affords exceptional opportunities for seeing and studying most of the varieties of the diseases of women. Clinical assistants are entitled to receive notice of all operations performed within the Hospital upon giving their names and addresses to the hall porter, and every facility is afforded them by the gynæcologists in the out-patient department of examining patients and obtaining experience in diagnosis and treatment.

The number of clinical assistants appointed to each gynæcologist is as far as possible limited to two, though occasionally a third may be appointed.

The clinical assistants attend on two afternoons a week, and it is advisable that they should take a three months' course, but to meet the convenience of medical practitioners, it is permitted to attend for a shorter period, and on one or more days a week if it can be arranged.

A fee is charged at the rate of two guineas a month, which becomes due on joining.

A certificate is given at the end of a three months' course.

The out-patients are seen daily at 1.30, except on Saturdays when they are seen at 9.30.

HOSPITAL FOR SICK CHILDREN, GREAT ORMOND STREET, W.C.

CLINICAL instruction will be given as usual by members of the visiting staff. In the case of those who are absent on Military Service, arrangements have been made for their work to be carried on as usual. In the case of "special classes," these will only be held in the event of a sufficient number of applications being made.

The Medical School was founded in 1852 at the same time as the Hospital, for the attainment and diffusion of knowledge regarding the diseases of children, by Dr. Charles West, who had for a colleague in its inception Dr., afterwards Sir William, Jenner.

The School is now recognized by the University of London

HOSPITAL FOR SICK CHILDREN, GREAT ORMOND STREET—(cont.)

as a public educational institution, at which teachers are regularly engaged in giving adequate courses of instruction of a University standard.

The practice of the Hospital is open to qualified medical practitioners, and to students who have completed four years of medical study, the Hospital having been recognized by the Conjoint Board of England as a place where six months of the fifth year may be spent in clinical work.

There are 240 beds in the Hospital, divided as follows:—

95	Medical.
105	Surgical.
40	Whooping Cough.
	Diphtheria.
	Intercurrent Infectious Diseases.
	Observation.

Over 3,000 in-patients pass through these beds yearly, while about 20,000 new patients are seen in the out-patient department.

The following salaried appointments are made by election from time to time:—

Resident.—Medical superintendent yearly, house physicians (2) half-yearly, house surgeons (2) half-yearly.

Non-Resident.—Bacteriologist yearly, medical registrar and pathologist yearly, casualty officer yearly.

The practice of the Hospital includes:—

In-Patients' Department.—Accompanying the visiting physicians and surgeons on their rounds, during which clinical instruction is given; attending operations and post-mortems. Clinical clerkships are also open to students at a reduced fee.

Out-Patients' Department.—Attendance in the consulting rooms of the physicians and surgeons to out-patients during the examination of patients. Clinical instruction (on new cases) is given between 10 and 11 a.m. Clinical assistantships are open to students.

There are special ophthalmic, aural, dental, pathological, and electrical departments.

There is also a museum and library in connection with the School.

HOSPITAL FOR SICK CHILDREN, GREAT ORMOND STREET—(cont.)

Fees For Clinical Instruction.

			£	s.	d.
One month's ticket	-	-	-	2	2 0
Three months' ticket	-	-	-	5	5 0
Perpetual ticket	-	-	-	10	10 0
Special fee for clinical clerks for 3 months	-	-	-	1	1 0

Ophthalmological Clerkships.—Clinical clerkships are appointed once a month. Fees—1*l.* 1*s.* for a month's attendance.

Pathological Clerkships.—Facilities are afforded for obtaining theoretical and practical instruction in clinical pathology and bacteriology in the pathological laboratories. Clerks attend for about four hours daily.

Fees.

			£	s.	d.
For one month	-	-	-	3	3 0
„ two months	-	-	-	5	5 0
„ Three months	-	-	-	6	6 0

A reduction is made in the case of those already holding tickets for general attendance at the Hospital.

Special Post Graduate Classes.—Special courses of instruction in the diseases of children are held three times during the year. In addition to the ordinary practice of the Hospital, special classes illustrated by cases, specimens, skiagrams, operations, etc., are arranged to extend over six weeks of each Session. Further details and full syllabus may be obtained by application to the Dean or the Secretary of the Hospital. Fee for each course of six lectures, 1*l.* 1*s.*

Surgical Diseases of Children.—A special course of instruction in the surgical diseases of children is given on Tuesdays and Fridays, from 5.15 p.m. to 6.15 p.m., throughout the year. Fee for six attendances, 1*l.* 1*s.*

The Hospital is situated close to the intersection of High Holborn and Kingsway, and can be reached comfortably from any part of London by the Tube Railways (British Museum, Chancery Lane, Holborn, Russell Square or Tottenham Court Road), Metropolitan Railway (Euston Square, King's Cross or Temple), or by any of the numerous omnibus or tram lines passing though Holborn or Southampton Row.

**QUEEN'S HOSPITAL FOR CHILDREN, HACKNEY ROAD,
BETHNAL GREEN, E.**

IN spite of the War, all arrangements will, as far as possible, be carried out.

The practice of the Hospital can be attended by arrangement through the secretary. 134 beds and 30 at Branch Little Folks' Home, Bexhill.

Patients in 1914.—In, 1,736; out, 41,892; new (87,582 attendances).

Physicians attend daily at 1.45 (except Saturday), 9.30 a.m. Wednesday and Friday, at 9.30 a.m. also skin cases.

**ALEXANDRA HOSPITAL FOR CHILDREN WITH HIP DISEASE,
QUEEN SQUARE, W.C.**

STUDENTS, on the recommendation of their professors, are allowed to visit the clinics and qualified men on presenting their cards.

ROYAL LONDON OPHTHALMIC HOSPITAL, CITY ROAD, E.C.

THE opportunities for clinical work in the out-patient department will be the same as usual; and a clinical demonstration is given three mornings in the week by a member of the staff.

Owing to the diminution in the number of students, as a result of the War, there will be no set lectures or demonstrations unless a sufficient number of students intimate their willingness to attend them.

**ROYAL WESTMINSTER OPHTHALMIC HOSPITAL, KING
WILLIAM STREET, W.C.**

OWING to the lack of post-graduate students on account of the War, no classes will be held at this Hospital during the autumn. Practical instruction in the examination and treatment of eye cases will be given, as usual, in the out-patient department.

ROYAL EYE HOSPITAL, ST. GEORGE'S CIRCUS, SOUTHWARK S.E.**LONDON SCHOOL OF OPHTHALMIC SURGERY AND MEDICINE.**

LECTURES, practical demonstrations, instruction in refraction

ROYAL EYE HOSPITAL, ST. GEORGE'S CIRCUS, SOUTHWARK—(cont.)

work and demonstrations on pathological specimens in the museum will be given throughout the Winter and Summer Sessions by the teaching staff of the Hospital. Clinical instruction is given daily in the out-patient department at 10 a.m. and 2.30 p.m. There are annually more than 21,000 new patients attending at the Hospital. Ample opportunity is consequently afforded for practitioners and senior medical students to acquire a practical knowledge of ophthalmology.

**CENTRAL LONDON OPHTHALMIC HOSPITAL, JUDD STREET,
ST. PANCRAS, W.C.**

THIS Hospital, lately rebuilt, has 28 beds, and possesses a well-equipped laboratory, and every facility for clinical teaching daily. Last year there were 367 in- and 10,058 out-patients (entailing 27,387 attendances). Classes of instruction in the various branches of ophthalmology will be held during the Winter Session, beginning in October. The out-patient work commences at one o'clock daily, and operations are performed between one and four.

**CENTRAL LONDON THROAT AND EAR HOSPITAL,
GRAY'S INN ROAD, W.C.**

THE arrangements for post-graduate teaching, for lectures, and for demonstrations will depend upon the number of students enrolling, but the following syllabus has been drawn up in the hope that in spite of the War it may be carried through in its entirety :—

SYSTEMATIC CLASSES AND COURSES OF INSTRUCTION AND DEMONSTRATIONS.

Three courses of instruction are open to practitioners attending the Hospital ; first, the course in *Methods of Examination and Diagnosis* ; second, the course of *Systematic Instruction in the Diseases of the Nose, Throat, and Ear* ; and third, the *Operative Surgery Class*.

I. *The Course in Methods of Examination and Diagnosis* is introductory in character. It comprises four lessons of practical teaching in the actual examination of patients and in the manipulation of instruments. Clinical Assistants, especially if they have not had any previous experience in the

CENTRAL LONDON THROAT AND EAR HOSPITAL, GRAY'S INN ROAD—(cont.)

speciality, are expected to attend this class in order to become acquainted with the *minutiae* of the methods of diagnosis, etc.

Intending students (who can join at any time) are requested to give their names to the Dean.

The second course of

II. *Systematic Instruction in Diseases* is more advanced. It consists of over 30 lessons in all on pathology, diagnosis and treatment. Operative details are dealt with in the operative surgery class. Attendance at these classes is compulsory for those who desire to obtain the higher grade certificate.

**THE METROPOLITAN NOSE, EAR AND THROAT HOSPITAL,
FITZROY SQUARE, W.C.**

Facilities for Clinical Work are afforded to medical practitioners and senior students. Fee for one month, one guinea; for three months, two guineas.

Practical Demonstrations are given daily at 2.30 p.m. in the manipulation of instruments used in the diagnosis and treatment of diseases of the ear, nose, and throat.

Special Courses of Instruction are given in pathology and surgical treatment. Each course may begin at any date.

Clinical Assistants are appointed, and have responsible duties.

ROYAL EAR HOSPITAL, DEAN STREET, SOHO, W.

IN spite of the War, the usual courses will be given, as far as possible.

**ST. PETER'S HOSPITAL FOR STONE, HENRIETTA STREET,
COVENT GARDEN, W.C.**

ST. PETER'S HOSPITAL is intended for persons of both sexes, suffering from stone in the bladder and other diseases of the genito-urinary organs. Its object is—

First.—To benefit as large a number as possible of suffering poor by affording them, without a letter of recommendation, the advantages of hospital accommodation.

ST. PETER'S HOSPITAL FOR STONE, HENRIETTA STREET, COVENT GARDEN—(cont.)

Second.—To improve medical and surgical knowledge on this special subject, by bringing together a large number of patients afflicted with these diseases, and thus affording opportunities for observation and classification; and

Thirdly.—In persons suffering from stone: to investigate the best means of accomplishing its removal with the least possible danger to the life of the patient, and, whenever practicable, to substitute litholapaxy for Lithotomy.

Last year from 400 to 500 patients were admitted to the wards, and about 40,000 attendances of out-patients registered.

A ward containing six beds has been provided for patients in moderate circumstances, but capable of paying the costs of their keep—about 10s. a day. Patients admitted to this ward are asked to pay their fees in advance.

The surgeons give their services free to all patients admitted to the Hospital.

Patients availing themselves of the services of the anæsthetist are expected to pay a fee of one guinea to that officer.

Paying patients wishing to see their friends are requested to ask them to time their visits between 2.30 and 3.30 o'clock daily, except Wednesdays and Fridays, the operating days, when visiting is not allowed.

Men desirous of availing themselves of this accommodation should apply to the Secretary.

The surgeons must be Fellows of one of the Royal Colleges, or Master in Surgery of a University in the United Kingdom, duly registered, and not practising pharmacy or midwifery either alone or in partnership. The appointments being honorary, the surgeons are *ex-officio* members of Committee.

**ST. JOHN'S HOSPITAL FOR DISEASES OF THE SKIN,
49, LEICESTER SQUARE, W.C.**

It has not been found necessary to depart from the normal conditions which obtain in peace time.

The in-patient department is situated at 262, Uxbridge Road, W.

The out-patient practice at Leicester Square is open to the medical profession at the following times: every day from

ST. JOHN'S HOSPITAL FOR DISEASES OF THE SKIN, 49, LEICESTER SQUARE—(cont.)

2 to 3.30 p.m., and every evening (except Saturday) from 6 to 7.30. At the afternoon clinics, specially selected clinical demonstrations, as well as demonstrations on the different diseases presenting themselves in the out-patient department, will be given. The X-ray department is in operation on Tuesday, Wednesday, and Thursday afternoons. The Chesterfield Lectures will be given by Dr. Morgan Dockrell on Thursdays at 6 p.m. from October to March, beginning on October 7th. At the end of the course, the Chesterfield Medal may be competed for by those who have attended three-fourths of the lectures.

Courses of free lectures will also be given by other members of the staff, and these are advertised from time to time in the medical journals.

There is a well-equipped laboratory, where special courses in pathology and bacteriology of the skin may be arranged for.

**LONDON LOCK HOSPITAL AND RESCUE HOME, HARROW
ROAD, PADDINGTON, W.**

MALE Hospital and Out-Patient Department, 91, Dean Street, Soho, W. (Tel. Gerrard 7421). Hospital founded in Grosvenor Place in 1746; the Home in 1787. Female Hospital opened 1862. 250 beds.

Consulting Ophthalmic Surgeon—H. E. Juler.

Consulting Surgeons—J. E. Lane, B. Shillitoe, J. A. Bloxham, C. Gibbs.

Surgeons to Out-patients—C. Gibbs, A. Shillitoe, C. Ryall, H. J. Paterson, J. E. R. McDonagh.

Pathologist—A. Fleming.

Anæsthetist—R. Parsons.

Dental Surgeon—J. S. Lafferty.

Secretary—H. J. Eason. Office, 283, Harrow Road, W. (Tel. Padd. 3866).

ROYAL DEVON AND EXETER HOSPITAL, EXETER.

It is not intended to make any special arrangements because of the War during the forthcoming Session in connection with the medical school.

GENERAL HOSPITAL, NORTHAMPTON.

THIS Hospital is not attached to a recognized medical school and there are no classes nor courses of lectures arranged.

There is, however, every opportunity for a student to gain excellent practical experience in the wards—both medical and surgical; the operating theatre; the out-patient department—including a special ophthalmic section—and the casualty room.

The Hospital serves a large area, and a considerable proportion of the cases are accidents or “emergencies.”

The beds at present number 298. Of these, 120 are for wounded soldiers; 68 for medical; 10 for ophthalmic, and the remainder for general surgical cases.

During the twelve months ending July 1915, 1,330 major operations have been performed.

There is also an up-to-date electrical and radium department, in which most excellent work is being done.

The fee for a non-resident student attending for clinical instruction is 10*l.* 10*s.*

The resident appointments as house surgeon and house physician are recognized for the M.D. and M.S. (Lond.) and the F.R.C.S.

SOUTH DEVON AND EAST CORNWALL HOSPITAL, PLYMOUTH.

WHILE this Hospital is recognized by the Conjoint Examining Board of the Royal Colleges of Physicians and Surgeons as a provincial hospital, enabling gentlemen desiring instruction in medicine, surgery, or dispensing, to be received as pupils, there are not always pupils attending, and at the present time only one, so that there are no special arrangements beyond the ordinary working of the Hospital for the coming Session.”

COUNTY HOSPITAL, YORK.

SUITABLE arrangements can be made for the attendance of Fourth and Fifth Year Students, and good opportunities are available for medical and surgical work.

At the present time there are 180 beds (including 70 for

COUNTY HOSPITAL, YORK—*cont.*

Military cases).

In-patients 1914 1,600, out-patient attendances 34,500, and there were over 1,000 operations under anæsthetics.

The honorary staff consists of 3 physicians, 4 surgeons, 2 ophthalmic surgeons, 2 electro-theraputists, 3 anæsthetists, and 1 dental surgeon. There are 2 resident medical officers.

Several members of the honorary staff are on military service. Great difficulty has been experienced in obtaining resident medical officers, and at the present time there is only one instead of two.

THE UNIVERSITY, EDINBURGH.

THE medical classes in the University will go on as usual in spite of the War.

GRADUATION IN MEDICINE AND SURGERY.

Degrees and Diplomas in Medicine and Surgery.

I. FOUR degrees in medicine and surgery shall be conferred by the University of Edinburgh, namely, Bachelor of Medicine (M.B.), Bachelor of Surgery (Ch.B.), Doctor of Medicine (M.D.), and Master of Surgery (Ch.M.). The degree of Bachelor of Surgery shall not be conferred on any person who does not at the same time obtain the degree of Bachelor of Medicine, and the degree of Bachelor of Medicine shall not be conferred on any person who does not at the same time obtain the degree of Bachelor of Surgery.

[These degrees admit to the Medical Register. They qualify for practice throughout His Majesty's dominions, and for admission to the Naval, Military, and other public Medical Services.]

II. Subject to regulations to be made from time to time by the Senatus, with the approval of the University Court, the University may confer diplomas in special branches of medical and surgical practice on graduates in medicine and surgery of the University of Edinburgh, and also on other legally qualified medical practitioners who shall have pursued a prescribed course of study for the diploma in the University.

[University diplomas are granted in tropical medicine and

THE UNIVERSITY, EDINBURGH—(cont.)

hygiene (D.T.M. and H.) and psychiatry (Dipl. Psych.); and a University certificate is granted in diseases of tropical climates.

OPPORTUNITIES FOR HOSPITAL PRACTICE.

Royal Infirmary, Edinburgh.—900 beds. Perpetual ticket, in one payment, 12*l.*; annual ticket, 6*l.* 6*s.*; six months, 4*l.* 4*s.*; three months, 2*l.* 2*s.*; one month, 1*l.* 1*s.* Separate payments, amounting to 12*l.* 12*s.*, entitle to a perpetual ticket.

Royal Edinburgh Hospital for Sick Children.—120 beds, of which 50 are reserved for surgical cases. Hospital ticket for one year, 1*l.* 1*s.*, entitling student to attend the general practice of the hospital, including the out-patient department.

Edinburgh Royal Maternity and Simpson Memorial Hospital.—40 beds available for clinical instruction. The fee charged is:—For three months' course, consisting of internal clinical instruction and 12 practical cases, 3*l.* 3*s.*

City Hospital, Colinton Mains.—For fevers and infectious diseases. Number of beds, 600. Fee for the course, 1*l.* 1*s.*

Royal Mental Hospital, Morningside.—500 beds, available for clinical instruction to members of the class of mental diseases. The fee for the course is 2*l.* 2*s.*

Total number of beds available for the clinical instruction of students of the University, 2,160.

Fees, etc.

The minimum total amount of matriculation, class, examination, and hospital fees for the full medical course (five years) is about 158*l.*, divided *approximately* as follows:—

	£
First year - - - - -	40
Second year - - - - -	22
Third year (including perpetual hospital ticket, 12 <i>l.</i>) - - - - -	41
Fourth year - - - - -	45
Fifth year - - - - -	10
	<hr/>
	£158

The fees for each Session are paid at the beginning of

THE UNIVERSITY, EDINBURGH—(cont.)

the session. There is no composition fee.

To the foregoing sum requires to be added the cost of books and instruments, which might be estimated at from 5*l.* to 10*l.* per annum.

Board and lodging may be obtained in Edinburgh, comfortably from, say, 1*l.* to 1*l.* 10*s.* a week.

SCHOOL OF MEDICINE OF THE ROYAL COLLEGES, EDINBURGH.

THE number of students varies much in the classes and subjects. It is within the limit to say that, before the War, about 1,000 students availed themselves each session of the opportunity of attending the School. The lectures qualify for the University of Edinburgh and other Universities, the Royal Colleges of Physicians and Surgeons of London, Edinburgh and Dublin, the Faculty of Physicians and Surgeons of Glasgow, and other Medical and Surgical and Public Boards.

The anatomy rooms and laboratories will open, and the lectures commence on Tuesday, 5th October.

In accordance with the statutes of the University of Edinburgh, one-half of the qualifying classes required for graduation may be attended in this School, including the classes of clinical medicine and clinical surgery. The regulations require that the fee for any class taken for graduation in Edinburgh shall be the same as that for the corresponding class in the University. The whole education required for graduation at the University of London may be taken in this School.

The appointment of resident physician to the wards in the Royal Infirmary under the care of the ordinary physician is open to those members of their clinical class who have held the office of clerk in their wards for at least six months. Six residents are appointed for a period of six months each. Resident surgeons are also appointed by the ordinary surgeons to the hospital. In all respects the students are taught under regulations similar to those at the University of Edinburgh and other Universities of Scotland, and they receive similar certificates at the close of each session.

The courses on special non-qualifying subjects have for

SCHOOL OF MEDICINE OF THE ROYAL COLLEGES EDINBURGH—(cont.)

the last quarter of a century formed a marked feature of the School. Indeed, such medical subjects could be studied in Edinburgh only in this School until lately, when the University of Edinburgh appointed from the School lecturers on diseases of the eye, insanity, diseases of children, and tropical diseases to take charge of classes intra-murally.

The School offers a large choice of lecturers upon the various subjects comprised in the medical curriculum and, though a number of the lecturers are on Military service, it is not anticipated that any difficulty will arise because of the War, to prevent the whole medical course being given during 1915-16.

SCHOOL OF MEDICINE FOR WOMEN, EDINBURGH.

THIS School offers a complete medical curriculum to women students.

The courses of instruction entitle women students to present themselves for the medical examinations for University degrees, and also qualify for the examinations of the Royal Colleges of Physicians and Surgeons and the Royal Faculty of Physicians and Surgeons, Glasgow, and other licensing boards.

The majority of the classes are held at Surgeons' Hall. Students receive their clinical instruction in the wards set apart for the purpose in the Royal Infirmary, also in the Royal Hospital for Sick Children, the City Hospital for Infectious Diseases, Bangour Hospital for Mental Diseases, the Royal Maternity Hospital and the public dispensaries.

The fees are similar to those charged by the University and the School of Medicine of the Royal Colleges.

A students' sitting-room is provided.

ROYAL HOSPITAL FOR SICK CHILDREN, SCIENNES ROAD, EDINBURGH.

THE details as to the teaching arrangements are still somewhat uncertain, owing to the large proportion of teachers and students who will be on Military service. It is intended that the course shall be the ordinary one, so far as is possible in

ROYAL HOSPITAL FOR SICK CHILDREN, SCIENNES ROAD, EDINBURGH—(cont.)

the circumstances, and it will begin on October 5th, at 11 a.m.

The course consists of clinical instruction in the wards, surgical theatre, and out-patient departments of the Children's Hospital on three days of the week from 11 to 1 o'clock. At the commencement of the term there are ten systematic lectures, delivered in the New University buildings in the afternoon. There are also demonstrations given in the Pathological department of the Hospital.

No arrangements for post-graduate teaching in the Autumn Session have been made this year. The teaching is participated in by all the members of the Hospital staff.

THE UNIVERSITY, GLASGOW.

THE normal arrangements at Glasgow University for the instruction of medical students are not likely to be very greatly affected by the War. The total number of students will be somewhat diminished owing to students joining the fighting units, but students of the fourth and fifth years will in nearly all cases continue their studies without interruption, in order to obtain their qualifications as soon as practicable, in accordance with the advice of the Army Medical Service. Some of the members of the teaching staff are engaged in the War, but their places in the work of the medical school will be taken by others.

ST. MUNGO'S COLLEGE AND ROYAL INFIRMARY, GLASGOW.

IN spite of the War, the usual courses of instruction, embracing all the compulsory subjects of the medical curriculum, will be given during the ensuing Winter Session, which opens on Monday, 18th October. The Royal Infirmary, one of the largest in the kingdom (600 beds), presents a very wide and valuable field for clinical instruction. Vacation classes in clinical medicine, clinical surgery, and operative surgery, will be held during September and October, suitable for students preparing for final examinations in October.

WESTERN MEDICAL SCHOOL, GLASGOW.

IN common with other places of medical education, this

WESTERN MEDICAL SCHOOL, GLASGOW—(cont.)

School has suffered curtailment of its activities through the absence of members of the staff, and students on Military or Naval service. Arrangements have, however, been already made for holding classes in anatomy, medicine, midwifery and diseases of the throat and nose, beginning with the Winter Session about the middle of October; probably before that time arrives, further classes will be announced.

**QUEEN MARGARET SCHOOL, UNIVERSITY OF GLASGOW—
MEDICAL SCHOOL FOR WOMEN.**

IN spite of the War, the arrangements are the same as usual. The next Session begins on October 18th, 1915.

WESTERN INFIRMARY, GLASGOW.

CLINICAL CLASSES.

THE new Session begins 18th October 1915.

Attendance will be given in the superintendent's office from 9 till 12 o'clock daily, except Saturdays, during the first fortnight of the Session, for the enrolment of students and the receiving of fees for the clinical classes.

Students who have hospital tickets require to show them. No student will be enrolled for a clinical class without presenting his hospital ticket.

As the class lists are made up daily, students are requested to enrol as soon as possible.

Excerpt from the rules regarding tickets for Hospital attendance and clinical instruction:—

- 1.—No student shall be permitted to attend the Infirmary without a ticket duly signed by the superintendent.
- 2.—The fees payable shall be as follows:—

1st. Every student shall pay a fee of 10*l.* 10*s.*, for hospital attendance, and this shall be kept quite apart from the fees for clinical instruction.

2nd. Every student shall pay 2*l.* 2*s.*, for each Summer, and 3*l.* 3*s.*, for each Winter Session of instruction, or such other fees as may be fixed from time to time by the managers in conjunction with the University Court.

3rd. Students who have completed their clinical

WESTERN INFIRMARY, GLASGOW—(cont.)

course elsewhere shall be permitted to enter for a six months' course of the *Hospital only*, on payment of a fee of 2*l.* 2*s.*

- 3.—There shall be not less than two courses of clinical Instruction during each year.
- 4.—At the beginning of each course the student shall give intimation to the superintendent, of the clinical teacher whose course he wishes to attend, by filling up a form which will be supplied on application to the superintendent.
- 5.—The fees shall be paid to the superintendent, who shall give each student a ticket of admission to the lectures of the physicians or surgeons he wishes to attend. He shall also hand to each of the clinical lecturers a list of the students who have taken out tickets for their respective courses.
- 6.—Students shall have the privilege of accompanying the physicians or surgeons in their daily visits to the patients, and of attending operations and post-mortem examinations; but students are not permitted to enter any of the wards except at the visit hour and in the presence of the physicians and surgeons.
- 7.—Students may be allowed the use of the Journals for examination, on application to the superintendent, who shall appoint the time and place for the examination. The books shall not, on any account or pretext whatever, be carried out of the hospital, or be written upon or otherwise defaced. No student shall remain in the hospital after the hour of visit, except by the express permission of a physician or surgeon, or of the superintendent.
- 8.—Students, when accompanying the physicians and surgeons in visiting the wards, shall on no account annoy the patients with unnecessary questions, or offer any advice or opinion to them relative to their diseases; nor can they be allowed to approach such patients as the physicians or surgeons may think proper to keep quiet or private.
- 9.—The area of the operation room during operations

WESTERN INFIRMARY, GLASGOW—(cont.)

shall be reserved for the attending physicians and surgeons, medical visitors, and assistants, and no persons shall be allowed in the area excepting those whom the operating surgeon deems necessary.

- 10.—If any student shall be guilty of infringing any of the above regulations, he shall be liable to forfeit the benefit of his ticket, and the privilege of ever attending the House in future.

ROYAL HOSPITAL FOR SICK CHILDREN, GLASGOW.

THE War will not affect the carrying on of the work in any of the departments, nor the teaching arrangements. Certain of the junior members of the staff are absent on Military service, but their work will be carried on by substitutes or assistants.

For the clinical instruction of students, the year is divided into three terms. First term begins October 18th, 1915.

Special courses of lectures and clinical instruction on the medical and surgical diseases of children, meeting the requirements of Glasgow University Medical Ordinance (No. XXXI.), will be given in each of said terms. The class will meet daily at 11 a.m., and will consist of 15 medical and 15 surgical meetings.

Further, Glasgow University Court has recognized the Hospital under the relevant sub-sections of Section VIII. of said Medical Ordinance No. XXXI. for the purpose of Hospital attendances and for clinical study during the fifth and final year of the curriculum.

Students attending the Hospital in their third year of clinical study will be given every opportunity of taking part in the regular clinical work in the wards, under the supervision of the visiting physicians and surgeons. Medical students are admitted to the Dispensary, West Graham Street, during the hours of attendance of the physicians and surgeons.

Hospital fee admitting to Hospital, Dispensary, and country branch for one term, 1*l.* 1*s.*; or for whole year, 2*l.* 2*s.* Fee for clinical instruction and said special course, for one term, 1*l.* 15*s.* Students will be enrolled by, and fees are payable to,

ROYAL HOSPITAL FOR SICK CHILDREN, GLASGOW—(cont).
the medical superintendent.

COUNTRY BRANCH, DRUMCHAPEL, DUMBARTONSHIRE.

Lower ward is visited twice weekly by Mr. Alfred Young, or his substitute, assistant, or resident house surgeon.

Upper ward is visited twice weekly by Mr. Alexander MacLennan, or his substitute, assistant, or resident house surgeon.

OPHTHALMIC INSTITUTION, GLASGOW.

THERE will be no post-graduate classes at the Glasgow Ophthalmic Institution this autumn, owing to the War, but the ordinary course of instruction for undergraduates will be conducted as usual.

GLASGOW EAR, NOSE AND THROAT HOSPITAL,
27, ELMBANK CRESCENT, GLASGOW.

THERE are no new arrangements because of the War.

UNIVERSITY COLLEGE, DUNDEE. (ST. ANDREWS UNIVERSITY.)

THE University confers the degrees of Bachelor of Medicine and Bachelor of Surgery, Doctor of Medicine and Master of Surgery, and a diploma in Public Health. The whole curriculum may be taken at Dundee, or the first two years of the course may be taken in St. Andrews and the remaining three years in Dundee. The medical buildings and laboratories, are fully equipped in all departments for teaching and for research.

Clinical Instruction is given at the Dundee Royal Infirmary, which has 400 beds with special wards for maternity cases, diseases of women, diseases of children, diseases of the eye, diseases of the ear, throat and nose, diseases of the skin, cancer, and for cases requiring electrical treatment. Further instruction in diseases of the eye is given at the Dundee Eye Institution; clinical instruction in fevers is given at the Municipal Fever Hospital; and clinical instruction in mental diseases at the Dundee District Asylum.

Appointments.—Six resident medical assistants and an

UNIVERSITY COLLEGE, DUNDEE. (ST. ANDREWS UNIVERSITY)—(cont.)

out-door obstetric assistant are appointed annually at the Dundee Royal Infirmary. At the District Asylum, the appointments include two qualified resident medical assistants, and two resident clinical assistants.

Bursaries.—At the United College, St. Andrews, nine Taylour-Thomson entrance bursaries for women, of the annual value of from 15*l.* to 25*l.* each—tenable for three years—preference to women medical students. One Malcolm bursary of the value of 25*l.*, tenable by men or women (entrants), for five years. Additional bursaries, ranging in value from 50*l.* to 10*l.*, are open to entrant students of medicine, arts or science. All these bursaries are competed for annually in June. Schedules of application, subjects of examination, and conditions of tenure may be obtained from the secretary up to 23rd May 1916. Specimen examination papers (6*d.*) may be had from the secretary. At University College, Dundee, twelve entrance bursaries of the value of 15*l.* each, and fourteen second and third years' bursaries of the value of 20*l.* and 15*l.* are open to competition. Two fourth and two fifth year's bursaries of 20*l.* each are open to students who take the complete curriculum in Dundee. These are all tenable for one year. Other bursaries, of which the patronage is vested in trustees, are available.

The fees for the complete course, exclusive of the examination fees, amount to 136*l.* 10*s.*

ROYAL INFIRMARY, DUNDEE.

THE Dundee Royal Infirmary, founded 1782, has a provision of over 530 beds available for the treatment of patients. In the infirmary itself, there are 400 beds (of which nearly 300 are constantly occupied) which may be used for the teaching of students. The number of in-patients last year was 4,589, and of out-patients (medical, surgical, gynæcological, ear, throat and nose, skin, children, electrical and dental) over 14,000. There is a large maternity department—279 patients having been treated in the wards, and over 900 outside.

The Royal Infirmary forms the chief clinical part of the Dundee Medical School. There are seven resident medical officers, who are appointed as a rule each for a period of six months.

THE UNIVERSITY, ABERDEEN.

FACULTY OF MEDICINE.

THE new Session begins on Thursday, 14th October, when it is expected that, in spite of the War, classes will meet in all the ordinary subjects qualifying for graduation in medicine and surgery.

The degrees granted by the University are M.B., Ch.B., M.D., and Ch.M., and a diploma in Public Health is conferred after examination on qualified graduates of any University of the United Kingdom. There are four professional examinations for M.B. and Ch.B. and the cost of matriculation, class and degree fees for the whole curriculum is usually about £60. Clinical instruction is obtained at the Royal Infirmary, Sick Children's Hospital, City Fever Hospital, Royal Lunatic Asylum, and other institutions in Aberdeen.

UNIVERSITY OF DUBLIN, TRINITY COLLEGE, DUBLIN.

THE next Session will begin on October 1st. The various courses of lectures and practical work will be conducted as usual. Clinical instruction will be given at each of the recognized general hospitals in the city.

Students who are not less than five years in the school, and who have attended all the required courses of instruction, may, if they are volunteering for active service, present themselves at the special final examinations to be held on September 13th.

On account of the War, it has been decided not to hold the usual post-graduate course this autumn.

UNIVERSITY COLLEGE, CORK.

IN spite of the War, arrangements have been made to go on as usual, and so far as can be seen the full programme will be efficiently carried out.

Registration.—The attention of students is specially directed to the absolute necessity for their being registered with the Branch Medical Council, not later than fifteen days after the commencement of those courses of lectures, certificates of

UNIVERSITY COLLEGE, CORK—(cont.)

attendance on which they have to produce.

The following examinations held in Ireland are recognized by the General Medical Council, and students who have passed any of them or any other examination so recognized, can be registered as soon as they have commenced attendance on medical lectures :—

*The matriculation examination of the National University.

The preliminary examination of the Royal Colleges of Physicians and Surgeons of Ireland.

*The middle and senior grade examinations held by the Board of Intermediate Education, provided the certificate includes all the subjects required by the General Medical Council.

Forms of application can be obtained and filled up in the Registrar's office during office hours, and at other times specially appointed by notice posted in the College. Students, attending in the office to fill the form, must bring with them the certificate of the examination which they have passed, and the certificate of their birth.

Students who have passed one of the above-named examinations, or any other examination recognized by the General Medical Council, will be admitted to the study of medicine at the College without further examination, but they cannot proceed to the degrees of the National University, unless they have passed the matriculation examination of that University, or of the late Royal University, or some examination exempting from the matriculation examination of the National University.

Courses shall not be chosen in any case, except with the sanction of the Dean of the Faculty.

The degrees of M.B., B.Ch., and B.A.O., shall be granted only at the same time and after the student has pursued the approved courses of study, which shall qualify for obtaining these degrees. A student shall not be eligible to obtain these degrees unless he

(a) shall have completed the prescribed course of study in the Faculty of Medicine, extending over a period

The examinations marked (*) are held at local centres in Cork.

UNIVERSITY COLLEGE, CORK—(cont.)

of not less than five academic years from the date of his registration as a student of medicine by the General Medical Council ;

- (b) shall have passed the prescribed examinations ; and
- (c) shall have attained the age of 21 years.

The Senate shall not confer the degrees of M.C., B.Ch., and B.A.O., upon any person who has not pursued in the University, or in one or more of its constituent colleges, during at least nine terms, the courses of study prescribed for such degrees. The Senate may accept the periods of study pursued in any other University or in any School of Medicine recognized for this purpose by the Senate, equivalent in duration to not more than six terms, as equivalent to part of such approved course of study. The periods of study so accepted shall be deemed to have been terms kept within the meaning of the statute.

It is open to students to proceed to the degrees and diplomas of the National University of Ireland, and to the degrees of M.B., M.D., B.S. (Bachelor of Surgery), and M.S. (Master in Surgery), and a certificate in subjects relating to public health, in the University of London, and to the diplomas conferred on candidates who have passed the examinations held by the conjoint examining boards in Dublin, Edinburgh, and London.

The arrangements in the Faculty of Medicine are made chiefly with reference to the requirements of the National University. In all cases, students are cautioned to ascertain for themselves that, in the various matters, such as the particular courses of lectures they take out, the order in which they take them, the amount of attendance required, etc., etc., they comply with the regulations of the Institution for whose qualification they intend to proceed.

UNIVERSITY COLLEGE, GALWAY, IRELAND.

LECTURES for the Session 1915-16 will begin on 12th October. The handbook of the College, the College calendar, and the College regulations for degrees and for courses give full information regarding the College. The handbook can be

UNIVERSITY COLLEGE, GALWAY, IRELAND—(cont.)

obtained *gratis*, post free, from the Registrar. The Calendar (1s. 4d. by post), and the Regulations (4d. by post) can be obtained from Messrs. O'Gorman & Co., Galway.

The War is not likely to affect the arrangements for lectures, etc. Some of the professors have offered their services to the War Office. Should these services be accepted, substitutes will be employed.

QUEEN'S UNIVERSITY, BELFAST.

1. THERE shall be six degrees of the University in the Faculty of Medicine, viz. :—

Bachelor of Medicine (M.B.),
Bachelor of Surgery (B.Ch.),
Bachelor of Obstetrics (B.A.O.),
Doctor of Medicine (M.D.),
Master of Surgery (M.Ch.), and
Master of Obstetrics (M.A.O.).

2. The degrees of M.B., B.Ch., and B.A.O. shall be the primary degrees in the Faculty of Medicine, and shall be conferred at the same time and after the same course of study. No student shall be admitted to the final examination for these degrees until he has shown (1) that he is a matriculated student of the University, (2) that he has completed the prescribed course of study in the Faculty of Medicine extending over a period of not less than five academic years from the date of his registration as a student of medicine by the General Council of Medical Education and Registration of the United Kingdom, and (3) that he has passed the several examinations prescribed.

3. The Senate shall not confer the primary degrees in the Faculty of Medicine upon any person who has not attended in the University during three academic years at least the courses of study prescribed for such degrees. The Senate may accept, for not more than two academic years of the required five, courses of study pursued in any other University or School of Medicine approved by the Senate.

4. Every candidate for the primary degrees in medicine shall be required to show that he has attained the age of

QUEEN'S UNIVERSITY, BELFAST—(cont.)

21 years on or before the day of graduation.

5. The degrees of M.D., M.Ch., M.A.O. shall not be conferred, nor shall any of them, until the expiration of at least three academic years, or in the case of graduates of the University in Arts or Science of at least two academic years after admission to the primary degrees in the Faculty of Medicine. Every candidate must show that in the interval he has pursued such courses of study or been engaged in such practical work as may be prescribed. Any of these degrees may be conferred by the Senate either (a) after an examination, or (b) on the submission of a thesis or other evidence of original study or research to be approved by the Faculty of Medicine after an oral or other examination of the candidate on the subject thereof.

1. All candidates for the degrees of M.B., B.Ch., and B.A.O. shall be required to have satisfied the examiners in the several subjects of four examinations, namely:—

The first medical examination.

The second medical examination.

The third medical examination.

The fourth medical examination.

Two examinations will be held during the year.

Candidates will not be allowed to present themselves for more than one of the medical examinations at the same time.

There are entrance scholarships, £40, and four scholarships at each of the four medical examinations of value £40—£50.

There are valuable post-graduate scholarships and a special prize fund.

In spite of the War, the usual classes will be held during the Session 1915-16, and the Session will open on 1st October.

The Senate at its last meeting adopted the following resolutions:—

“All male students who are in attendance at the University as matriculated students shall, during the continuance of the War, be required to attend a course of physical and military training for at least two hours a week for the first and second

QUEEN'S UNIVERSITY, BELFAST—(cont.)

terms of the session, and obtain a certificate of efficiency, unless they furnish to the Committee of Discipline satisfactory evidence of inability to perform the necessary work; and that no fee shall be charged the student for such tuition; that the subject of physical and military training be added to the subjects of each of the Faculties of Arts, Science, Law, Medicine, and Commerce."

ROYAL VICTORIA HOSPITAL, BELFAST.

It is hoped as far as possible to continue the usual clinical work of this Hospital during the coming Session in spite of the War. The Board of Management have placed 100 beds for wounded soldiers at the disposal of the War Office. These are beds which up to the commencement of the War had been closed. Several members of the medical staff have gone to the Front, and their places will be temporarily supplied by members of the junior staff. A good deal of extra work has been placed on several members of the medical staff by the opening of the Ulster Volunteer Force Hospital for wounded soldiers. This is housed in the Exhibition Hall and the Samaritan Hospital for Women, and will shortly accommodate 200 patients. The patients usually treated at the Samaritan are distributed between the Royal Victoria Hospital and the Ulster Hospital for Women and Children.

At the Royal Victoria Hospital the number of resident physicians and surgeons has been reduced so as to free every possible newly-qualified man for the Front. It is expected that a special examination for students intending to serve with the Forces will be held at the beginning of the year, but no definite arrangements have yet been made.

HOSPITAL FOR SICK CHILDREN, QUEEN STREET, BELFAST.

CLINICAL INSTRUCTION will not be affected by the War, and will be resumed at the above Hospital on Wednesday, October 13th, 1915.

During the coming Session two courses of lectures will be delivered on the medical and surgical diseases incidental to infancy and childhood. The first will extend from October to January; the second from January to April. Students

HOSPITAL FOR SICK CHILDREN, QUEEN STREET, BELFAST—(cont.)

joining in October may attend both courses without additional fee. Demonstrations in ophthalmology and pathology will be given, and ample opportunities will be afforded in the wards (which contain 45 beds) and in the out-patient department, which is largely attended, for gaining a practical and theoretical knowledge of the diseases of infancy and childhood.

Students desirous of joining are requested to call at the Hospital any Wednesday or Saturday morning at 10 o'clock, when the secretary of the medical staff will be in attendance.

This Hospital grants certificates in diseases of children, which are recognized by the various examining bodies.

A *Gold Medal* will be offered for competition at the close of the Session. It will not be awarded unless, in the opinion of the examiners, sufficient merit be shown.

Fee for the Session—Two guineas. Fee for re-attendance—One guinea.

BELFAST FEVER HOSPITALS.

BELFAST CITY FEVER HOSPITAL, PURDYSBURN.

BELFAST UNION FEVER HOSPITAL.

BELFAST CITY SMALL POX HOSPITAL.

It is proposed to hold the clinical classes in the Belfast Fever Hospitals *as usual* this year.

Clinical classes are held during the Winter and Summer Sessions at the Belfast Fever Hospitals, commencing in October and April.

Lecturer, A. Gardner Robb, M.B., D.P.H., Medical Superintendent.

Fee for the course of three months, three guineas.

Diploma in Public Health.—Post-graduate courses (D.P.H.) are held from time to time by arrangement with the Medical Superintendent.

COOMBE LYING-IN HOSPITAL AND GUINNESS DISPENSARY, DUBLIN.

THE Clinique will continue to operate as formerly. The master lectures daily in the wards, and students will take their cases. No marked reduction in the latter is anticipated. At the present time over 30 students are in residence.

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SIR PATRICK DUN'S HOSPITAL, GRAND CANAL STREET, DUBLIN.

THIS Hospital, established 100 years ago, has always been closely connected with Trinity College, Dublin, and the School of Physic in Ireland, being mainly staffed by the professors of that school.

In spite of the War, the new Session will begin on 1st October. Clinical instruction is given daily by the physicians and surgeons.

Special classes for students commencing their Hospital studies are held in the wards during the months of October, November and December.

There is a special wing for fever cases where clinical instruction is regularly given.

Special departments for diseases of women; diseases of throat, nose and ear; X-rays, diagnosis and treatment; pathology; dentistry; out-patients and accidents, are carried on all the year round.

A resident surgeon with salary is appointed annually, also six resident pupils are appointed from the members of the class, each half-year, as well as three medical and three surgical dressers each month.

The Haughton clinical medals and prizes (value about 17*l.* each) are offered each year in medicine and in surgery, and are open to all students of the Hospital.

The Hospital fees are :—

	£	s.	d.
Winter and Summer Session -	12	12	0
Winter Session (six months) -	8	8	0
Summer Session (three months)	5	5	0
Special Certificate in Anæsthetics	1	1	0

The practice of the Hospital is open to all students of medicine, the certificates being recognized by Dublin University, The National University and the Royal Colleges of Surgeons of England, Ireland and Scotland.

MATER MISERICORDIÆ HOSPITAL, DUBLIN.

STUDENTS of any one of the three medical schools in Dublin may take their hospital course here. No special arrangements for the coming Session are in contemplation.

MEATH HOSPITAL AND COUNTY DUBLIN INFIRMARY, DUBLIN.

ARRANGEMENTS will be carried out as usual, in spite of the War.

There are 148 beds for intern patients, and about 18,000 extern poor are annually supplied with advice and medicine. Applications for admission to be made at the Hospital, from nine to ten o'clock every week-day, at which hour the physicians and surgeons attend to give advice, and order medicines for externs. Cases of accident are admitted at any hour of the day or night. Persons paying twenty guineas become governors for life; such as pay two guineas annually, governors for the year, and subscribers of one guinea per annum are entitled to recommend patients.

Session 1915-16.—The clinical practice of the Hospital will begin on October 1st, at 9 a.m.

ROTUNDA HOSPITAL, DUBLIN.

THE Rotunda Hospital is, perhaps, the largest, the longest established, and the most famous Gynæcological and Maternity Hospital in the British Empire. It was founded in 1745, and since then has been increased by many additional buildings and wards. The most important of these are the Thomas Plunket Cairnes Wing for gynæcological patients, opened in 1895; the Pathological Laboratory, opened in 1902; the Nurses' Home, opened in 1907; the new Labour Wards, opened in 1912; and the restoration of the students' quarters in 1913. The work done, both in the Hospital and in its extern maternity department, is very large. Thus, during the year 1912 to 1913, 2,124 patients were confined in their own homes under the care of the students of the hospital; 2,012 patients were confined in the wards of the hospital; 585 patients were admitted to the gynæcological wards, and some 463 operations were performed; and 13,373 attendances were recorded at the hospital dispensaries.

The daily routine for students consists of attendance at the morning lectures on midwifery and gynæcology, attendance at and examination of patients in the gynæcological department, attendance at operations, personal conduction of labour cases in the intern and extern maternities, and attendance at all

ROTUNDA HOSPITAL, DUBLIN—(cont.)

cases of abnormal labour in the hospital wards.

All students examine in rotation the hospital patients, both gynæcological and maternity, and thus get ample opportunity of making vaginal and bi-manual examinations and of acquiring skill in gynæcological and obstetrical diagnosis.

All students are allowed to visit the lying-in and gynæcological wards twice daily (in addition to the morning clinique), for the purpose of following the course of cases and of taking notes.

All students conduct in rotation the labour cases both in the intern and extern maternities.

All students assist in rotation at obstetrical operations and minor gynæcological operations.

Medical practitioners who take out a course at the hospital are, in addition, allowed to help in rotation at all major operations. Medical practitioners who take out a two-months' course or longer are further allowed to perform a considerable amount of practical work, such as douching, perinæorrhaphy, and the application of the forceps in the maternity department, and as curetting, perinæorrhaphy, and operations on the cervix in the gynæcological department. As these opportunities are afforded in rotation, the longer the course taken the greater the number, and the more varied the nature, of the operations performed. Opportunities of performing and instruction in cystoscopy are also afforded.

Owing to the War the number of pupils attending is somewhat diminished; but the number of patients in both departments is larger than ever, and consequently there are increased opportunities for individual study.

THE CERTIFICATES OF THE HOSPITAL.

Medical students who attend the Hospital for the purpose of taking their necessary courses in practical midwifery or gynæcology are given certificates stating the number of attendances and of labour cases which they have conducted. These certificates are also given to any medical practitioners who may desire them.

Special certificates in gynæcology, and special certificates

ROTUNDA HOSPITAL, DUBLIN—(cont.)

in midwifery are given to medical practitioners who have taken out a two-months' course or longer.

The L.M. certificate or diploma, as instituted under the charter of the hospital in 1756, is awarded to all students who, on the completion of a six-months' course, pass an examination in the midwifery practice of the Hospital.

Certificates of attendance at the hospital courses are accepted by all universities and licensing bodies.

HOSPITAL APPOINTMENTS.

Clinical Assistants.—A certain number of clinical assistants are appointed from amongst students who have finished a six-months' course, and have obtained the L.M. Diploma of the hospital. The duties of these assistants are as follows:—

- (1) To administer anæsthetics in the extern maternity department.
- (2) To assist the clinical clerk at the two o'clock dispensary.
- (3) The dressing of septic cases in the gynæcological wards.
- (4) To keep records of abdominal cases and their after-history.
- (5) To keep records of special treatments and operations in the labour ward.
- (6) Any other duties assigned to them by the Master.

In addition to these duties, clinical assistants have the fullest opportunities of following the work of the hospital in all its departments.

The post can be held for a period of either three or six months, at the option of the holder, and subject to the approval of the Master. The fee for the three months' appointment is five guineas, for the six months' appointment ten guineas.

Extern Assistants.—A paid extern assistant is appointed every three months after competitive examination from amongst the students of the Hospital, who have obtained the L.M. certificate. He holds office for three months as junior assistant, and then, if found suitable, for three months as senior assistant. These officers are responsible for the manage-

ROTUNDA HOSPITAL, DUBLIN—(cont.)

ment of the extern maternity department under the direction of the Master and his assistants. They obtain very great opportunities of performing obstetrical operations, and of treating abnormal cases.

Assistants to the Master.

Assistants to the Master are selected from amongst those who have held the post of extern assistant. They hold office for a period of three years, during which time they are responsible for the management of the Hospital under the direction of the Master.

Days.	Time.	Subject.
Monday -	10 to 11 11 to 12.30	Lecture in maternity wards. Examination of patients and minor operations.
Tuesday -	10 to 12.30 11.30 to 12.30	Major operations. Lecture on elementary midwifery.
Wednesday -	10 to 11 11 to 12.30	Lecture in maternity wards. Examination of patients and minor operations.
Thursday -	10 to 12.30 11.30 to 12.30	Major operations. Lecture on elementary midwifery.
Friday -	10 to 11 11 to 12.30	Lecture in gynæcological wards. Examination of patients and minor operations.

Students who are beginning the study of midwifery are strongly advised to attend regularly during their first three months at the Hospital the clinical lectures on elementary midwifery.

ROYAL CITY OF DUBLIN HOSPITAL, DUBLIN.

THE new Session begins on 1st October and terminates on March 31st. Fees for six months' hospital attendance, 8*l.* 8*s.* Three months', 5*l.* 5*s.*

Certificates of attendance are recognized by all the universities, colleges and halls, and by the Army, Navy and

ROYAL CITY OF DUBLIN HOSPITAL, DUBLIN—(cont.)

other examining boards.

The arrangements of this hospital offer pupils an opportunity of observing disease in every form; and, since its enlargement and rebuilding, many important and additional facilities for students have been provided. At the morning visit, which commences at 9 o'clock daily, the nature, treatment and progress of the cases are explained at the bedside. Medical and surgical lectures are delivered on special cases, and pathological specimens exhibited. In addition to the clinics, medical and surgical, on alternate days, there is a special set of lectures given in the Winter Session to first year students only. There is a special wing for fevers and infectious diseases. There are special wards for ophthalmic and aural cases, and a special ward also for diseases peculiar to women. There is a large section of the hospital also devoted to children, and, since the commencement of the present War, there are 55 beds devoted to the treatment of wounded soldiers.

Connected with the hospital is a largely attended daily dispensary, at which the pupils are allowed to perform minor operations under the guidance of the surgeons, and are rendered familiar with the details of dispensary management, and the art of prescribing. There are special dispensaries for diseases of the eye and ear, of the skin, of the throat, and also for diseases peculiar to women; at all of these practical instruction is given. There are also well-equipped Röntgen rays and Lupus light departments.

Dressers to the surgeons and clinical clerks to the physicians are appointed, and certificates awarded for the satisfactory performance of the duties. A salaried resident medical officer is appointed annually. Surgical and medical resident pupils are appointed periodically, and each pupil holds office for three months. Special certificates are awarded if merited. Women resident pupils are admitted.

A gold medal, presented by the late Mr. Wheeler, is awarded annually, if merited; the examination is held alternately in medicine and surgery.

REGULATIONS OF THE CONJOINT BOARD.

THE EXAMINING BOARD IN ENGLAND BY THE ROYAL COLLEGE OF PHYSICIANS OF LONDON AND THE ROYAL COLLEGE OF SURGEONS OF ENGLAND. UNDER THE PROVISIONS OF CLAUSE XIX. OF THE MEDICAL ACT (1858), AND CLAUSE III. OF THE MEDICAL ACT (1886).

REGULATIONS relating to the several Examinations.—These Regulations apply to Candidates who began their professional study on or after the 1st day of May, 1907.

SECTION I.

I. Candidates who desire to obtain the Licence of the Royal College of Physicians of London and the Diploma of Member of the Royal College of Surgeons of England are required to complete five years of professional study after passing a recognized Preliminary Examination in the subjects of General Education, to comply with the following Regulations, and to pass the Examinations hereinafter set forth.

II. Applications and Inquiries with reference to the Examinations for the Licence of the Royal College of Physicians of London and the Diploma of Member of the Royal College of Surgeons of England, should be addressed to the Secretary, Examination Hall, 8-11, Queen Square, Bloomsbury, London, W.C., from whom Forms of the required Certificates may be obtained.

III. Any communication relating to the Regulations should contain the Candidates' names in full and the date at which they passed the Preliminary Examination in General Education, or of their registration as Medical Students.

IV. There are three Examinations, called herein the First Examination, the Second Examination, and the Third or Final Examination.

V. These Examinations will be held in the months of January, April, July and October, unless otherwise appointed.

VI. Candidates intending to present themselves for Examination are required to give notice in writing to the Secretary

of the Examining Board in England fourteen clear days before the day on which the Examination commences, transmitting at the same time the required Certificates.

VII. All Fees must be paid three days prior to the day on which the Examination commences.

VIII. The Certificates of Professional Study will be required to show that Students have attended the courses of Professional Study to the satisfaction of their Teachers.

IX. Students are required to attend Examinations which are held in the several Classes.

X. Exemptions from the conditions of admission to the several Examinations can be granted only by the Committee of Management.

Books of Questions set at the several Examinations of the Board, from June 1886 to October 1887, and each year from 1888 to 1914, inclusive, may be obtained on application to Messrs. Taylor and Francis, Red Lion Court, Fleet Street, London, E.C. Price 6d. each, post-free 7d. A book of Questions is published annually.

SECTION II.

Preliminary Examination.

I. All Candidates must pass a Preliminary Examination in General Education recognized by the Examining Board in England, a list of which may be obtained on application.

First Professional Examination.

II. Before admission to the First Professional Examination Candidates must produce evidence of having received instruction in Chemistry, Physics, Biology, and Practical Pharmacy, unless they propose to postpone Practical Pharmacy until a later Examination.

III. Chemistry, Physics, and Biology must be studied at a Medical School or other Institution recognized by the Examining Board in England.

The certificates must state that the Candidate has attended not less than 180 hours' instruction and laboratory work in Chemistry; 120 hours' instruction and laboratory work in Physics; and 120 hours' instruction and laboratory work in Biology. These courses need

not be completed within one year, nor need they run concurrently, and they may be commenced or attended before the Candidate passes the required Preliminary Examination in General Education.

The Instruction in Practical Pharmacy may be received at any time before the Student enters for Examination in that subject, and must be given by a registered Medical Practitioner, or by a Member of the Pharmaceutical Society of Great Britain, or in a Public Hospital, Infirmary, or Dispensary.

IV. Six months' instruction at a recognized Institution other than a Medical School will be counted as part of the Curriculum of Professional Study, if such attendance is subsequent to the date of passing the required Preliminary Examination in General Education.

V. The subjects of the First Professional Examination are :—

Part I.—Chemistry.

Part II.—Physics.

Part III.—Elementary Biology.

Part IV.—Practical Pharmacy.

VI. The Examination is partly written, partly oral, and partly practical.

VII. Candidates may present themselves for the First Professional Examination immediately after passing the Preliminary Examination in General Education, provided they are able to produce the Certificates required by paragraph III.

VIII. Candidates must present themselves for Examination in Parts I. and II. together (unless they claim exemption from one of them under the conditions of paragraph XII.) until they have reached the required standard to pass in both, or in one of these parts, but they will not be allowed to pass in one part unless they obtain at the same time at least half the number of marks required to pass in the other part. Candidates may take Parts III. and IV. separately, or they may present themselves for the whole Examination at one time.

IX. Practical Pharmacy may be taken with, or at any time before Part I. of the Final Examination.

X. Candidates referred in any Part, or in all four Parts,

of the First Examination will not be admitted to re-examination until after the lapse of a period of not less than three months from the date of their reference. Candidates referred in Chemistry and Physics, or in Elementary Biology will be required, before being admitted to re-examination, to produce Certificates that they have received further instruction in that subject or subjects, to the satisfaction of their teachers, at an Institution recognized for the purpose by the Examining Board, for a period of not less than three months subsequently to the date of their reference.

XI. The fees for admission to the First Examination are as follows :—

	£	s.
For the whole Examination, payable on first admission to any part or parts thereof	-	10 10
Re-examination after rejection in Parts I. and II.	3	3
Do. Do. Part III.	-	2 2
Do. Do. Part IV.	-	2 2

XII. Candidates who shall produce satisfactory evidence of having passed an examination for a Degree in Medicine in any of the subjects of the First Examination conducted at a University in the United Kingdom, in India, or in a British Colony, will be exempt from examination in the subjects in which they have passed.

Second Professional Examination.

XIII. The study of Anatomy and Physiology will not be recognized, until Candidates have passed in two of the first three parts of the First Examination, viz., Chemistry, Physics, and Biology.

XIV. Before admission to the Second Professional Examination, Candidates must produce evidence :—

1. Of having dissected, at a recognized Medical School, for not less than twelve months during the regular Sessions, the Dissections to have included the whole human body.
2. Of having attended, at a recognized Medical School :—
 - (a) A course of Lectures on Anatomy during not less than six months, or one Winter Session.
 - (b) A course of Lectures on Physiology.

(c) A course of Practical Physiology, including Histology, extending over a period of six months.

XV. The subjects of this Examination are : Anatomy and Physiology.

XVI. The examination is partly written, partly oral, and partly practical.

XVII. Candidates will be required to pass in both subjects at one and the same time.

XVIII. Candidates will be admissible to the Second Examination on the completion of the above courses.

XIX. Candidates referred on the Second Examination will be required, before being admitted to re-examination, to produce a Certificate that they have pursued, to the satisfaction of their Teachers, in a recognized place of Study, their Anatomical and Physiological Studies during a period of not less than three months subsequently to the date of their reference.

XX. The Fees for admission to the Second Examination are as follows :—

	£	s.
For the whole Examination -	-	10 10
For re-examination after rejection -	-	6 6

Final Professional Examination.

XXI. Before admission to the Third or Final Professional Examination, Candidates must produce evidence :—

1. Of having attended, at a recognized Medical School :

- (a) A course of Lectures on Medicine during not less than six months, or one Winter Session.
- (b) A course of Lectures on Surgery during not less than six months, or one Winter Session.
- (c) A course of Lectures on Midwifery during not less than three months.
- (d) A course of Lectures on Pathology during not less than six months.
- (e) A course of Lectures on Pharmacology and Therapeutics during not less than three months.
- (f) A course of Lectures on Forensic Medicine, including Insanity, during not less than three

months.

(g) A course of Lectures on Public Health.

(h) Systematic Practical Instruction in Medicine, Surgery, and Midwifery, including :

1. The application of Anatomical knowledge to the investigation of Diseases.

2. The methods of examining various Organs and other Parts of the Body, in order to detect the evidence of Disease or the effects of Accidents.

3. The employment of Instruments and Apparatus used in diagnosis or treatment.

4. The examination of Diseased Structures, whether recent or preserved.

5. The examination of the Urine and other secretions, and of morbid products.

6. Post-mortem Examinations.

7. Practical Instruction in Pathological Histology, including not less than 18 Classes.

8. Practical Instruction in Clinical Pathology and Bacteriology, including not less than 18 Classes.

(i) Of having themselves performed Operations upon the Dead Subject to the satisfaction of their Teachers.

NOTE.—The Certificate must state the number of Operations performed.

2. Of having attended, at a recognized Hospital with a Medical School, after passing the Second Examination :—

(a) The practice of Medicine and Surgery, including Clinical Instruction during two Winter and two Summer Sessions.

(b) Demonstrations in the Post-mortem room, including practical instruction in making Post-mortem Examinations, during twelve months.

(c) Clinical Lectures on Medicine and Surgery during nine months.

(d) A course of not less than twelve Clinical or other Lectures with Practical Instruction in Diseases

peculiar to Women.

3. Of having discharged the duties of Medical Clinical Clerk during six months, and of Surgical Dresser during other six months, of which in each case not less than three months shall have been in the Wards.

4. Of having discharged the duties of Clinical Clerk in the Gynæcological Wards or Out-Patients department of a recognized Hospital for three months.

5. Of having received, at a recognized Medical School and Hospital, instruction in the administration of Anæsthetics to the satisfaction of their teachers.

6. Of having attended Clinical Instruction in Ophthalmic Surgery in the Ophthalmic department of a recognized General Hospital, or at an Ophthalmic Hospital recognized for the purpose by the Examining Board in England, during not less than three months.

7. Of attendance at a Fever Hospital.

8. Of having attended Clinical Demonstrations at a recognized Lunatic Asylum.

9. Of having conducted 20 Labours, after fulfilling the conditions of Clauses 1 (*h*) so far as Midwifery is concerned, and 3.

NOTE.—This Certificate must be signed by a member of the Staff of a Lying-In Hospital or of a Maternity Charity of a General Hospital, or by the Dean of the Medical School attached to the General Hospital.

10. Of having received instruction in Vaccination.

The Certificate must be such as will qualify its holder to contract as a Public Vaccinator under the Regulations, at the time in force, of the Local Government Board.

11. Of being 21 years of age.

12. Six months of the last year of the curriculum may be spent in Clinical Study at, at least, two Hospitals or Infirmarys specially recognized for the purpose, a list of which may be obtained on application.

XXII. The subjects of this Examination are :—

Part I. Medicine, including Medical Anatomy
Pathology, Practical Pharmacy,* Therapeutics

Forensic Medicine, and Public Health.

* Candidates who have already passed in Practical Pharmacy will not be re-examined in that subject at the Third Examination.

Part II. Surgery, including Pathology, Surgical Anatomy, and the use of Surgical appliances.

Part III. Midwifery and Diseases peculiar to Women.

XXIII. The Examination in Medicine and Surgery comprises written papers and Clinical, Practical, and *vivâ-voce* examinations.

XXIV. The Examination in Midwifery and Diseases of Women comprises a written paper and a *vivâ-voce* examination.

XXV. Candidates will be examined on diseased structures, whether recent or preserved, including microscopical specimens, in each part of the Examination.

XXVI. Candidates may take this Examination in parts, or they may present themselves for the whole Examination at one time. They will be required to produce the following Certificates before being admitted to the respective parts of the Examination, viz. :—

In Medicine :—

Of having attended the courses prescribed in Section II.

Paragraph XXI. Clauses 1 (a) (d) (e) (f) (g) (h),

2 (a) (b) (c), 3, 5, 7, 8, and 10 ;

and of being 21 years of age.

In Surgery :—

Of having attended the courses prescribed in Section II.

Paragraph XXI. Clauses 1 (b) (d) (h) (i), 2 (a) (b)

(c), 3, 5, 6, and 10 ;

and of being 21 years of age.

In Midwifery :—

Of having attended the courses prescribed in Section II.

Paragraph XXI. Clauses 1 to 9 ;

and of being 21 years of age.

XXVII. Candidates will be admissible to Parts I. II. and III. of the Third or Final Examination at the expiration of two years (24 months) from the date of passing the Second

Examination, and on production of the required certificates of study provided that the Examination is not completed before the expiration of five years (five Winter and five Summer Sessions) from the date of passing the Preliminary Examination.

XXVIII. Candidates referred on the Third or Final Examination, or on one or more of the three Parts into which they may have divided it, will not be admitted to re-examination until after the lapse of a period of not less than three months from the date of rejection, and will be required, before being admitted to re-examination, to produce a Certificate, in regard to Medicine and Surgery, of having attended the Medical and Surgical Practice, or the Medical or Surgical Practice, as the case may be, at a recognized Hospital during the period of their reference; and, in regard to Midwifery and Diseases peculiar to Women, a Certificate of having received, subsequently to the date of their reference, not less than three months' instruction in that subject by a recognized Teacher.

NOTE.—A candidate who possesses a registrable qualification is admissible to re-examination without producing additional Certificates.

XXIX. The Fees for admission to the Third or Final Examination are as follows:—

	£	s.
For the whole Examination, payable on first admission to any part or parts thereof - - -	21	0
Part I. For re-examination in Medicine including Medical Anatomy, Pathology, Therapeutics, and Public Health - -	5	5
For re-examination in Practical Pharmacy (If taken at this Examination.)	2	2
„ II. For re-examination in Surgery, including Pathology, Surgical Anatomy and Appliances - - - - -	5	5
„ III. For re-examination in Midwifery and Diseases peculiar to Women - -	3	3

XXX. Every Candidate who shall have passed the Third or Final Examination and who shall have paid the required fees is, subject to the Bye-Laws of the two Colleges, entitled

to receive :—

The Licence of the Royal College of Physicians of London,
and

The Diploma of Member of the Royal College of Surgeons
of England.

SECTION III.

Special Regulations.

I. Candidates who shall have obtained Colonial, Indian or Foreign Qualifications which entitle them to practise Medicine or Surgery in the country where such Qualifications have been conferred, after a course of study and Examination equivalent to those required by the Regulations of the two Colleges, will, on production of satisfactory evidence as to age, and proficiency in Vaccination, and on payment of the required Fees, be admissible to the Second and Third or Final Examinations without any intervals between them.

II. Members of English Universities who shall have passed such an Examination or Examinations at their University as shall comprise the subjects of the First and Second Examinations of the Examining Board in England, and who shall have completed the curriculum of medical study required by the Regulations of the Board, will, two years after having passed all the other required Examinations, be eligible for admission to the Third or Final Examination of the Board; any Candidates so admitted to Examination will be required to pay a Fee of Five Guineas; and any such Candidates who shall have passed the Third or Final Examination shall, on the further payment of not less than 35 Guineas, and subject to the Bye-Laws of each College, be entitled to receive the Licence of the Royal College of Physicians of London, and the Diploma of Member of the Royal College of Surgeons of England.

III. Members of a Scotch or Irish University who shall have passed such an Examination or Examinations at their Universities as shall comprise the subjects of the First and Second Examinations of the Examining Board in England, and who shall have completed the curriculum of Medical Study according to the Regulations required by their University, will, two years after having passed all the other required Examinations

ations, be eligible for admission to the Third or Final Examination of the Board; any Candidate so admitted to Examination will be required to pay a Fee of Five Guineas; and any such Candidates who shall have passed the Third and Final Examination shall, on the further payment of not less than 35 Guineas, and subject to the Bye-Laws of each College, be entitled to receive the Licence of the Royal College of Physicians of London, and the Diploma of Member of the Royal College of Surgeons of England.

IV. Members of Colonial, Indian, or Foreign Universities recognized from time to time for the purpose,* who shall have passed such an Examination or Examinations at their Universities for the Degree of Doctor or Bachelor of Medicine or Surgery as shall comprise the subjects of the First and Second Examinations of the Examining Board in England, and who shall have completed the curriculum of Medical Study required by the Regulations of the Board, will, two years after having passed such Examinations, be eligible for admission to the Third or Final Examination of the Board; any Candidates so admitted to Examination will be required to pay a Fee of 20 Guineas; and any such Candidates who shall have passed the Third or Final Examination shall, on the further payment of not less than 20 Guineas, and subject to the Bye-Laws of each College, be entitled to receive the Licence of the Royal College of Physicians of London, and the Diploma of Member of the Royal College of Surgeons of England.

Forms of Certificates required under the conditions of paragraphs II. and III. may be obtained of the Secretary of the Examining Board in England, Examination Hall, Queen Square, Bloomsbury, London, W.C.

REGULATIONS FOR OBTAINING THE DIPLOMA IN PUBLIC HEALTH.

REVISED 25th July, 1912. These revised Regulations came into force on the 1st June, 1913.

SECTION I.

Examination.

I. Candidates must have obtained a registrable Qualification

* A list of these Universities may be obtained on application.

in Medicine, Surgery, and Midwifery.

II. The Examination consists of two Parts. Part I. will be held in the months of April, June, and December, and Part II. in the months of January and July in each year.

III. Candidates must pass Part I. before being admitted to Part II.

IV. Candidates may enter for Parts I. and II. separately, or at the same time, but no Candidate's name will be published until both parts of the Examination have been passed.

V. The Examination in each Part will be written, oral, and practical.*

VI. The Fee for each admission to either Part of the Examination, which must be paid three days before the Examination commences, is 10*l.* 10*s.*, except in the case of Candidates who possess Diplomas granted by the Royal College of Physicians of London or the Royal College of Surgeons of England, who will be required to pay 6*l.* 6*s.* only.

VII. Candidates who fail to satisfy the Examiners in either part may present themselves again at the next Examination on payment of the same Fees.

VIII. The Diploma awarded is entitled "Diploma in Public Health of the Royal College of Physicians of London and the Royal College of Surgeons of England."

IX. Candidates intending to present themselves for either part of the Examination must give 14 days' notice in writing to the Secretary, at the Examination Hall, Queen Square, Bloomsbury, London, W.C.

SECTION II.

Conditions of Admission to Examination.

I. For Candidates who obtained a registrable Qualification on or before the 1st of January, 1890.

Candidates entitled to be registered under the Medical Act on or before the 1st of January, 1890, will be admissible to the Examination on producing evidence of the above Qualification.

II. For Candidates who obtained a registrable Qualification

* The Practical Examination in Part II. may include a visit to, and report on, some selected premises.

after the 1st of January, 1890.

Candidates will be admissible to Examination in Part I. on producing evidence :—

1. Of having been in possession of a registrable Qualification in Medicine, Surgery, and Midwifery for at least 12 months.
2. Of having attended, after obtaining such registrable Qualification, practical instruction in Chemistry, Bacteriology, and the Pathology of the Diseases of Animals transmissible to Man, in a Laboratory or Laboratories, recognized by the Examining Board in England, during a period of six months.

NOTE.—The certificate of attendance on this course must show that the Candidate has worked in the Laboratory for at least 240 hours, of which not more than half have been devoted to Chemistry.

3. Of being at least 23 years of age.

Candidates will be admitted to Part II. of the Examination on producing evidence :—

4. Of having spent not less than nine months in the special study of Public Health since obtaining a registrable Qualification.
5. Of having, after obtaining a registrable Qualification, been diligently engaged in acquiring a practical knowledge in the duties, routine and special, of Public Health Administration on not less than 60 working days during six months under the supervision of
 - (a) In England and Wales, the Medical Officer of Health of a County or of a single Sanitary District having a population of not less than 50,000, or a Medical Officer of Health devoting his whole time to Public Health work ; or
 - (b) In Scotland, a Medical Officer of Health of a County or Counties, or of one or more Sanitary Districts having a population of not less than 30,000 ; or
 - (c) In Ireland, a Medical Superintendent Officer of Health of a District or Districts having a population

of not less than 30,000 ; or

(*d*) In the British Dominions outside the United Kingdom, a Medical Officer of Health of a Sanitary District having a population of not less than 30,000, who himself holds a registrable Diploma in Public Health ; or

(*e*) A Medical Officer of Health who is also a Teacher in the Department of Public Health of a recognized Medical School ; or

(*f*) A Sanitary Staff Officer of Royal Army Medical Corps having charge of an Army Corps, District, Command, or Division, recognized for this purpose by the General Medical Council ; or

(*g*) An Assistant Medical Officer of Health of a County or of a Single Sanitary District having a population of not less than 50,000, provided the Medical Officer of Health of the County or District in question permits the Assistant Officer to give the necessary instruction and to issue Certificates.

Provided that the period of six months may be reduced to a period of three months, including attendance on at least 30 working days in the case of a Candidate who produces evidence that, after obtaining a registrable Qualification, he has attended a course or courses of instruction in sanitary law, vital statistics, epidemiology, school hygiene, and other subjects bearing on Public Health Administration, given by a Teacher or Teachers in the Department of Public Health of a recognized Medical School, or in the case of a Candidate who produces evidence of having been resident Medical Officer in a Hospital for Infectious Diseases containing not less than 100 beds during a period of three months.

NOTE.—Candidates who shall have produced evidence that they have themselves held for a period of not less than three years appointments as Medical Officer of Health of a Sanitary District within the British Dominions, and having a population of not less than 15,000, may be exempted from the requirement of paragraph 5.

6. Of having attended, twice weekly during three months

after obtaining a registrable Qualification, the practice of a Hospital for Infectious Diseases at which he has received instruction in the methods of Administration.

NOTE (1).—Methods of Administration shall include the methods of dealing with patients at their admission and discharge, as well as in the wards and the Medical Superintendence of the Hospital generally.

NOTE (2).—In the case of a Medical Officer of the Royal Army Medical Corps a certificate from a Principal Medical Officer under whom he has served, stating that he has during a period of at least three months been diligently engaged in acquiring a practical knowledge of Hospital Administration in relation to Infectious Diseases, may be accepted as evidence under Regulation 6.

7. Of being at least 24 years of age.

Laboratories recognized for the course of Laboratory Instruction. (Section I., II. 2.)

London.—St. Bartholomew's, Guy's, University College, King's College, Charing Cross, St. George's, St. Mary's, St. Thomas's, Westminster, Middlesex, Royal Institute of Public Health, Royal Naval College, Greenwich, Royal Army Medical College, Millbank.

Birmingham.—The University.

Brighton.—Technical School.

Bristol.—The University.

Cambridge.—The University.

Cape Town.—South African College.

Cardiff.—University College.

Edinburgh.—School of Medicine of the Royal Colleges.

Gibraltar.—Sanitary Commissioners' Laboratory.

Hongkong.—Government Laboratory.

Leeds.—The University.

Liverpool.—School of Science and Technology, The University.

Manchester.—Victoria University.

Newcastle-upon-Tyne.—University of Durham College of Medicine.

Nottingham.—University College.

Portsmouth.—The Municipal College.

Sheffield.—The University.

Fever Hospitals recognized for the attendance on Infectious Diseases. (Section II., II. 5.)

Barking.—Isolation Hospital.

Barnsley.—The Kendray Hospital for Infectious Diseases.

Birmingham.—Corporation Fever Hospital.

Brighton.—Borough Fever Hospital.

Bristol.—Public Health Department Hospitals; Corporation Fever Hospital.

Capetown.—Fever Hospital.

Cardiff.—Hospital for Infectious Diseases (The Sanatorium).

Chatham.—Royal Naval Hospital.

Colchester.—Borough Isolation Hospital.

Croydon.—Borough Fever Hospital.

Devonport.—Small Pox and Fever Hospital.

Great Yarmouth.—Fever Hospitals.

Leeds.—Corporation Fever Hospitals.

Liverpool.—Corporation Fever Hospitals.

London.—Metropolitan Fever Hospitals; West Ham Fever Hospitals (Plaistow and Dagenham); Hørnsey Borough Isolation Hospital, East Ham Borough Isolation Hospital.

Manchester.—Corporation Fever Hospital.

Newcastle-upon-Tyne.—Fever Hospitals.

Portsmouth.—Fever Hospital.

Sheffield.—City Hospitals.

Southampton.—Fever Hospital.

Swansea.—Borough Fever Hospital.

Willesden.—District Isolation Hospital.

Books of Questions set at the Examinations for the Diploma in Public Health during the years from 1887 to 1914 may be obtained on application to Messrs. Taylor and Francis, Red Lion Court, Fleet Street, London, E.C. Price 6d., post-free 6½d. each.

REGULATIONS FOR OBTAINING THE DIPLOMA IN THE DISEASES AND HYGIENE OF THE TROPICS.

Revised 8th January 1914.

I. The Examination will be held in the months of April

and July.

II. The Examination will consist of two parts :—

Part I. will comprise—(a) written questions, (b) oral questions, and (c) practical laboratory work in the following subjects : pathology and hæmatology, bacteriology, general parasitology, and protozoology.

Part II. will comprise—(a) written questions, (b) oral questions, and (c) clinical and laboratory work in Tropical Diseases and Hygiene. This will include helminthology, protozoology, zoology and entomology in their relations to Clinical Medicine.

III. The fee for admission to Part I. is 5*l.* 5*s.*, and the fee for admission to Part II. is 4*l.* 4*s.*

IV. Candidates may enter for Parts I. and II. separately, or together, but they will not be allowed to proceed to Part II. until they have passed Part I.

V. Candidates must give 14 days' notice in writing to the Secretary at the Examination Hall, 8-11, Queen Square, Bloomsbury, London, W.C., and produce at the same time the necessary certificates of study.

VI. Candidates must produce evidence of being in possession of a registrable Qualification in Medicine, Surgery, and Midwifery, and of having attended, subsequently to obtaining such registrable Qualification :—

- (1) Practical instruction in Bacteriology, Parasitology, Medical Zoology, and Hæmatology in a Laboratory recognized for this purpose during not less than six months.
- (2) Instruction in Hygiene applicable to Tropical Countries.
- (3) The Clinical Practice of a Hospital recognized for the study of Tropical Diseases during not less than six months.

VII. Graduates in Medicine or Surgery of Indian, Colonial, and Foreign Universities recognized by the Examining Board in England, but whose Degrees are not registrable in this country, may enter for the Examination for the Diploma in the Diseases and Hygiene of the Tropics on fulfilling the same conditions in regard to study. In such cases it must be understood that the Diploma, if obtained, will not be registrable

under the Medical Acts.

The above conditions of study may be modified at the discretion of the Committee of Management in the cases of a Candidate (a) who has been employed in Foreign or Colonial Medical Service; (b) who has been engaged in public professional or teaching work in Tropical Countries; (c) who has been engaged in original investigation in Tropical Countries.

Books of Questions set at the Examinations for the Diploma in Tropical Medicine during the years 1912 and 1914 may be obtained on application to Messrs. Taylor and Francis, Red Lion Court, Fleet Street, London, E.C. Price 6d., post free 6½d. each.

REGULATIONS RELATING TO THE LICENCE IN DENTAL SURGERY, L.D.S., R.C.S. ENG.

ALL applications with reference to the Examination for the Licence in Dental Surgery should be addressed to Mr. F. G. Hallett, Director of Examinations, Examination Hall, Queen Square, Bloomsbury, London, W.C.

Books of Questions set at the Examination for the Licence in Dental Surgery for the years from 1892 to 1914 may be obtained on application to Messrs. Taylor and Francis, Publishers, Red Lion Court, Fleet Street, London, E.C. Price 6d. each, post free 6½d.

SECTION I.

Preliminary Examination in General Education.

1. Candidates must be registered as Medical or Dental Students by the General Medical Council (299, Oxford Street, London, W.) or produce evidence of having passed one of the examinations in general education recognized by the Conjoint Examining Board in England, a list of which may be obtained from the Secretary of the Conjoint Examining Board in England, Examination Hall, Queen Square, Bloomsbury, London, W.C.

2. A Degree in Arts of any University of the United Kingdom, or of the Colonies, or of such other Universities as may be specially recognized from time to time by the Conjoint Examining Board in England, will be considered a

sufficient testimonial of proficiency.

3. In the case of holders of the Degrees of D.M.D. Harvard, D.D.S. Pennsylvania, and D.D.S. Michigan, evidence must be produced that a four years' high school course has been completed at a reputable high school with the equivalent of 60 counts.

SECTION II.

Preliminary Science Examination.

1. The Preliminary Science Examination consists of Part I. Chemistry and Part II. Physics, and is identical with Parts I. and II. of the First Examination of the Conjoint Examining Board in England. It is held in January, March or April, July and September in each year, and, in the case of students beginning recognized professional study on or after October 1, 1913, must be passed before the courses of study required for the Second Professional Examination are begun.

2. Candidates, who have passed the required Examination in General Education, may present themselves for the Preliminary Science Examination before, or after, entering at a Dental School.

3. Candidates must present themselves for examination in both Parts together (unless exempt from one of them), until they have reached the required standard to pass in both, or in one Part, but will not be allowed to pass in one Part without obtaining at the same time at least half the marks required to pass in the other Part.

4. Candidates must give 14 days' notice in writing of their intention to present themselves for this Examination, and at the same time forward a certificate—

Of having received instruction in Chemistry and Physics at an Institution recognized for the purpose.

The certificate must state that the candidate has attended not less than 180 hours' instruction and laboratory work in Chemistry, and 120 hours' instruction and laboratory work in Physics. These courses need not be completed within one year, nor need they run concurrently, and they may be commenced or attended before the candidate passes the required Preliminary Examination in General Education, but will not be

counted as part of the required four years of professional study unless taken after passing that Examination.

This requirement as to the number of hours' instruction does not apply to candidates who registered as Dental Students before June 1, 1904.

5. Any candidate referred at this Examination, who does not hold a registrable Medical or Dental Qualification, is required, before admission to re-examination, to produce a certificate of having received further instruction in the subjects, or subject, not passed, for a period of not less than three months subsequent to the date of reference.

Exemptions.

6. A candidate, who produces satisfactory evidence of having passed an examination in Chemistry and Physics, or in one of these subjects, for a degree in Medicine at a University recognized by the Conjoint Examining Board in England, is exempt from further examination in the subjects, or subject, so passed.

7. Candidates who hold the D.M.D. Harvard, the D.D.S. Pennsylvania, the D.D.S. Michigan, or the Licence of the Dental Board of Victoria, Australia, are not required to pass this Examination.

8. Candidates who registered as Dental Students before January 1, 1897, are not required to pass this Examination.

SECTION III.

First Professional Examination.

1. The First Professional Examination consists of Part I. Mechanical Dentistry and Part II. Dental Metallurgy, and is held in January, April and September in each year.

2. Candidates who have passed, or been exempted from, the Preliminary Science Examination may present themselves for the Parts of the First Professional Examination together or separately.

Part I.—Mechanical Dentistry.

3. This Examination is a practical one, conducted in the Mechanical Laboratory of one of the Dental Hospitals in

London.

4. Candidates must give twenty-one days' notice in writing of their intention to present themselves for the Examination, and at the same time forward certificates :—

- (1) Of registration as a Medical or Dental Student by the General Medical Council, or of having passed an Examination in General Education recognized by the Conjoint Examining Board in England.
- (2) Of having been engaged, during a period of not less than two years, in acquiring a practical familiarity with the details of Mechanical Dentistry, under the instruction of a competent Practitioner, or under the direction of the Superintendent of the Mechanical Department of a recognized Dental Hospital where the arrangements for teaching Mechanical Dentistry are satisfactory to the Board of Examiners in Dental Surgery.

This instruction may be taken prior to the date of passing the Examination in General Education, but will not be counted as part of the required four years of professional study unless taken after passing that Examination.

- (3) Of having attended at a recognized Dental Hospital and School :—
 - (a) A course of lectures on Dental Mechanics.
 - (b) A course of Practical Dental Mechanics, including the manufacture and adjustment of 6 dentures and 6 crowns.

5. At the Examination in Mechanical Dentistry, candidates will be required to provide themselves with the following instruments :—Wax spatula, double ended ; sculptors ; gouge and handle ; vulcanite files ; gold files ; pliers, pin-roughing and bending, and snipe-nose ; cutting nippers ; broaches and handles ; fret saw ; one Melotte's moldine outfit ; one Bunsen burner (laboratory) ; fine saws ; chasers, special ; blowpipe for mouth ; 12-in. solder tweezers ; crown holder ; shears, curved ; collar pliers, N.P. ; pin nippers, plain ; riveting hammer ; dividers, $4\frac{1}{2}$ -in.

The following instruments will be supplied by the Hospital

at which the candidates are examined :—Hammers for striking up plates ; horn mallets ; ordinary casting materials and apparatus.

6. Any candidate referred at this Examination, who does not hold a registrable Dental Qualification, will be required, before admission to re-examination, to produce a certificate of having received three months' further instruction under the conditions specified in Certificate (2), Clause 4.

Part II.—Dental Metallurgy.

7. This Examination is conducted by written paper.

8. Candidates must give 21 days' notice in writing of their intention to present themselves for the Examination, and at the same time forward certificates :—

- (1) Of registration as a Medical or Dental Student by the General Medical Council, or of having passed an Examination in General Education recognized by the Conjoint Examining Board in England.

This certificate will not be required if previously produced for Part I. Mechanical Dentistry.

- (2) Of having attended at a recognized Dental Hospital and School :—

- (a) A course of lectures on Dental Metallurgy.
- (b) A course of Practical Dental Metallurgy.

9. Any candidate referred at this Examination, who does not hold a registrable Dental Qualification, will be required, before admission to re-examination, to produce a certificate of having received, subsequently to the date of reference, not less than three months' instruction in Dental Metallurgy in a recognized Dental School.

Exemptions.

10. Candidates who registered as Dental Students before the 1st January, 1897, are not required to pass Part II. Dental Metallurgy.

SECTION IV.

Second Professional Examination.

1. The Second Professional Examination is held in

February, May or June, and November in each year, and consists of :—

PART I.—General Anatomy and Physiology, and General Pathology and Surgery.

PART II.—Dental Anatomy and Physiology, Dental Pathology and Surgery, and Practical Dental Surgery.

2. Candidates who have passed the First Professional Examination at least six months previously may present themselves for Part I. only or they may enter for the whole Examination at one time.

(The interval of six months is not required in the case of a Colonial or Foreign Dentist.)

3. Candidates who enter for Part I. only, must pass in Part I. before proceeding to Part II.

4. Candidates who enter for the whole Examination at one time may pass in Part I. although failing to pass in Part II. ; but, if they fail to pass in Part I., they will not be allowed to proceed with the Practical and Oral Examinations in Part II. In such cases the fee paid for admission to Part II. will not be forfeited, but will be held over until such time as the candidate is re-admitted to examination in that Part.

5. Every student who commences recognized professional study on, or after, the 1st of October, 1913, will be required to pass the Preliminary Science Examination before attending the courses mentioned in the following clauses, 7 and 12 :—

Part I.—General Anatomy, Physiology, Pathology, and Surgery.

6. The Examination in General Anatomy and Physiology, and General Pathology and Surgery, is partly written and partly oral.

7. Candidates must give twenty-one days' notice in writing of their intention to present themselves for this Examination, and at the same time forward certificates :—

(1) Of having attended at a recognized Medical School :—

(a) A course of lectures on Anatomy.

(b) A course of lectures on Physiology.

(c) A separate course of Practical Physiology.

*(d) A course of lectures on Surgery.

*(e) A course of lectures on Medicine.

* These lectures must be attended after the completion of the courses of lectures on Anatomy and Physiology.

- (2) Of having performed dissections at a recognized Medical School during not less than 12 months.
- (3) Of having attended, at a recognized Hospital or Hospitals, the practice of Surgery and clinical lectures on Surgery for 12 months during the ordinary sessions.
- (4) Of being 21 years of age.

8. Any candidate referred at this Examination, who does not hold a registrable Dental Qualification, will be required, before admission to re-examination, to produce a certificate of such additional study during three months at a recognized Medical School and Hospital as the Teachers of the School may determine.

Exemptions.

9. Candidates who are Members of the College, or who have passed the Examination in Surgery of the Conjoint Examining Board in England, or who produce evidence of having passed the Examination in Surgery for a Degree, or other Qualification, in Medicine or Surgery registrable under the Medical Act of 1886, are not required to pass Part I. of the Second Professional Examination.

10. Candidates who have passed the Second Examination of the Conjoint Examining Board in England, or who produce evidence of having passed the Examination in Anatomy and Physiology for a Degree, or other Qualification, in Medicine or Surgery registrable under the Medical Act of 1886, or for the Degree of M.D. of a Foreign or Colonial University recognized by the Conjoint Examining Board in England, are exempt from further examination in those subjects in Part I.

Part II.—Dental Anatomy, Physiology, Pathology, and Surgery.

11. This Examination is partly written, partly oral, and

partly practical. The written and oral Examinations comprise the subjects of dental anatomy and physiology, and dental pathology and surgery. The oral Examination is conducted by the use of preparations, casts, drawings, etc. At the practical Examination candidates may be examined:—

- (a) On the treatment of dental caries, on the preparation and treatment of teeth by filling with gold or other material, by inlaying or by crowning, and on other operations in dental surgery.

(Candidates must provide their own instruments.)

- (b) On the mechanical and surgical treatment of the various irregularities of children's teeth.

12. Candidates must give 21 days' notice in writing of their intention to present themselves for this Examination, and at the same time forward certificates:—

- (1) Of having been engaged during four years in the acquirement of professional knowledge subsequently to the date of registration as a medical or dental student.

(This certificate is not required from a colonial or foreign dentist.)

- (2) Of having attended at a recognized Dental Hospital and School:—

- (a) A course of dental anatomy and physiology.

- (b) A separate course of dental histology, including the preparation of microscopical sections.

- (c) A course of dental surgery.

- (d) A separate course of Practical Dental Surgery.

- * (e) A course of not less than five lectures on the Surgery of the Mouth.

- (f) A course of Dental Bacteriology.

- (g) A course of Dental Materia Medica.

* These lectures may be given either at a recognized Dental Hospital and School, in

which case the lecturer must be a qualified Surgeon practising Surgery, or they may be given at a recognized Medical School, and may form part of the course required by Clause 7 (1) (d).

(h) A course of practical instruction in the administration of such Anæsthetics as are in common use in Dental Surgery.

This certificate is not required from candidates who entered at a recognized Dental Hospital before the 1st October, 1909.

- (3) Of having attended at a recognized Dental Hospital and School, or in the Dental Department of a recognized General Hospital, the practice of Dental Surgery during two years.

13. Any candidate referred at this Examination, who does not hold a registrable Dental Qualification, will be required before admission to re-examination to produce a certificate of three months' additional study at a Dental Hospital.

SECTION V.

Fees.—Present Regulations.

1. The fee for the Diploma in Dental Surgery is Twenty Guineas.

2. The fees payable before admission to the several Examinations are as follows:—

		£	s.	d.
Preliminary Science Examination.	Each			
admission	- - -	3	3	0
First Professional Examination.	Each			
admission	- - -	2	2	0
Second Professional Examination.	Each			
admission. Part I.	- - -	2	2	0
Second Professional Examination.	Each			
admission. Part II.	- - -	3	3	0

3. Fees paid on first admission to the several Examinations, or parts thereof, will be counted as part of the total fee of Twenty Guineas for the Diploma.

Regulations to come into force on January 1, 1916.

The following scale of fees will come into force on the

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1st January, 1916, and will apply to all candidates who present themselves for any Examination for the Licence after that date.

1. The fee for the Diploma in Dental Surgery is Twenty Guineas.

2. The fees payable before admission to the several Examinations are as follows :—

				First Admission.			Re-examination.			
				<hr/>			<hr/>			
				£	s.	d.	£	s.	d.	
Preliminary Science Examination				-	3	3	0	3	3	0
First Professional Examination—										
Part I.	-	-	-	4	4	0	1	1	0	
Part II.	-	-	-	3	3	0	1	1	0	
Second Professional Examination—										
Part I.	-	-	-	5	5	0	2	2	0	
Part II.	-	-	-	5	5	0	3	3	0	
				<hr/>			<hr/>			
				£21			0 0			
				<hr/>			<hr/>			

3. Fees paid on first admission to the several Examinations, or parts thereof, will be counted as the fee, or part of the fee, of Twenty Guineas for the Diploma according to the amount so paid.

4. The balance of the fee of Twenty Guineas must be paid before the grant of the Diploma in cases in which the candidates have been exempted from some part of the Examination.

NOTE.—A ticket of admission to the Museum, to the Library, and to the College Lectures will be presented to each candidate who obtains the Diploma.

Candidates are requested to note that they do not become Licentiates in Dental Surgery of the College on passing the Second Professional Examination; that it rests with the Council of the College to confer the Diploma upon candidates who have become qualified for the Licence by fulfilling the requirements of the Board of Examiners in Dental Surgery and by paying the required fees; and that until the grant of the Diploma by the Council, they are not entitled to make use of the description L.D.S., R.C.S.Eng. (or

L.D.S.Eng.), the right to which is only acquired with the grant of the diploma.

List of recognized Dental Hospitals and Schools.

London.—Royal Dental Hospital of London. National Dental Hospital. Guy's Hospital Dental School. London Hospital Dental School.

Provincial.—Birmingham Dental Hospital and Birmingham University Dental Department. Liverpool Dental Hospital, and Liverpool University Dental School. Dental Hospital of Manchester, and Victoria University of Manchester Dental Department. Newcastle-on-Tyne Dental Hospital. Bristol Royal Infirmary and General Hospital, and Bristol University Dental Department. Sheffield Royal Hospital and Sheffield University Dental Department. Leeds Public Dispensary and Leeds University Dental Department.

Scotland.—Edinburgh Dental Hospital and School. Glasgow Dental Hospital and School.

Ireland.—*Dublin.*—Dental Hospital and School of Ireland. *Cork.*—University College.

United States of America.—Harvard University Dental Department and Hospital. Pennsylvania University Dental Department and Hospital. Michigan University Dental Department and Hospital.

List of Hospitals recognized for Dental Hospital Practice but unattached to a Dental School.

London.—St. Thomas's Hospital Dental Department. Westminster Hospital Dental Department.

Provincial.—Newcastle-on-Tyne Royal Infirmary, Dental Department. Plymouth Dental Hospital. Exeter Dental Hospital.



UNIVERSITY OF LONDON.

REGULATIONS IN THE FACULTY OF MEDICINE FOR
INTERNAL STUDENTS.*

THE University confers the Degrees of Bachelor of Medicine and Bachelor of Surgery (M.B., B.S.), and the Degrees of Doctor of Medicine (M.D.) and of Master of Surgery (M.S.).

NORMAL COURSE.

In order to be admitted to the Bachelors' Degrees a Student must normally, after registration as an Internal Student, have—(1) Attended Prescribed Courses of Study for five and a half years in one or more Schools of the University; (2) Passed the following examinations:—

(a) First Examination for Medical Degrees (Inorganic Chemistry, Physics, and General Biology). To be passed, as a rule, not less than nine months after Matriculation.†

(b) Second Examination for Medical Degrees:—

Part I.—(Organic and Applied Chemistry.) To be passed not less than six months after completing the First Examination and before entry to Part II. of the Second Examination.

Part II.—(Anatomy, Physiology, and Pharmacology, including Pharmacy and Materia Medica.) To be passed after passing Part I. of the Second Examination and not less than 18 months after completing the First Examination.

(c) Third Examination for Medical Degrees or M.B., B.S. Examination. (Medicine, Surgery, Midwifery, and

* The Regulations, etc., for External Students can be obtained from the External Registrar, University of London, South Kensington, S.W.

† Internal Students who matriculate in January will be permitted to enter for the First Examination for Medical Degrees in the following July, provided that they have attended the prescribed Course of Study for such Examination throughout the Session, and provided that they receive the approval thereof of the Governing Body of the School to which they belong, or, in the case of Students at an Institution other than a School of the University, of the recognized Teachers under whom they have studied.

Diseases of Women, Pathology, Forensic Medicine and Hygiene.) To be passed after completion of the Second Examination, not less than three years after passing in Anatomy and Physiology at the Second Examination, Part II., and not less than five years and a half after Matriculation.*

EXEMPTIONS.† ‡

Exemptions from the normal course of Study and Examinations may be granted as follows:—

1. In respect of *Matriculation*.

2. In respect of the *Course* for the *First Examination for Medical Degrees*, and in respect of that *Examination*.

(i) The Senate has power under Statutes 110 and 126 to permit, in special cases, modification of, or exemption from, the Course of Study anterior to the First Examination for Medical Degrees, provided that an equivalent course has been taken in the University or in a recognized Institution elsewhere.

(ii) The Senate has power also to permit, in special cases, exemption from the foregoing Examination, provided that an equivalent Examination has been taken in this or some other University.§

(iii) Students who have passed either the Preliminary Scientific Examination or the Preliminary Scientific Examination, Part I., under former Regulations, will be credited with having passed the First Examination

* But see under Exemptions, 5, below.

† Certain exemptions which apply only to a small number of Candidates who began their Medical Course under Regulations which have been for some time obsolete are not published with current Regulations; but information with regard to such exemptions is obtainable on application to the University.

‡ Students who have failed at any of the Examinations for Medical Degrees, but who passed in one or more subjects on the last occasion when they presented themselves for such examination and who have been debarred from presenting themselves for a corresponding Examination held between September, 1914 and a date to be determined later by the Senate, by service under the War Office or Admiralty, or by Hospital Service in connection with the War, will be credited with the subjects in which they passed on the occasion in question.

§ Applications under this section must reach the University not later than three months before the date of the Examination.

for Medical Degrees.

- (iv) Students who have passed in any Subject either at the Preliminary Scientific Examination or the Preliminary Scientific Examination, Part I. (or who under former Regulations have been entitled to exemption from examination in such subject at either of the above named Examinations in virtue of having passed in that subject at an Intermediate Examination in Science or Agriculture previously to June, 1909) will be credited with a pass in the corresponding subject at the First Examination for Medical Degrees and may complete that Examination under existing Regulations.
- (v) Students who have passed an Intermediate Examination in Arts, Science, or Agriculture, with Chemistry, or Physics, or Botany and Zoology,* will be exempted at the First Examination for Medical Degrees from examination in the Subjects in which they have passed, provided that they have completed the required Courses of Study.
- (vi) Students who have passed the B.A. or B.Sc. Examination with Physics, or Chemistry, or Botany and Zoology,* will be exempted at the First Examination for Medical Degrees from examination in the Subjects in which they have passed, provided that they have completed the required Courses of Study.
- (vii) Students who have presented themselves for an Internal Intermediate Examination in Science or Agriculture in the following four Subjects taken at the same time, viz., Chemistry, Physics, Botany and Zoology, and have been referred in one Subject, will be exempted at the First Examination for Medical Degrees from examination in the Subjects in which they have passed; provided that a Student referred in Botany or Zoology shall not be exempted in Biology.

* No exemption in General Biology at the First Examination for Medical Degrees will be granted to Students who have not passed an Intermediate Examination in Arts, Science, or Agriculture, or the B.Sc. Examination, with Botany and Zoology.

3. In respect of the *Course for the Second Examination for Medical Degrees, Part I.*, and in respect of that *Examination*.

- (i) The Senate has power under Statutes 110 and 126 to permit, in special cases, modification of, or exemption from, the Course of Study anterior to the Second Examination for Medical Degrees, Part I., provided that an equivalent Course has been taken in the University or in a recognized Institution elsewhere.
- (ii) Students who have passed the Preliminary Scientific Examination, Part II., under former Regulations will be credited with having passed the Second Examination for Medical Degrees, Part I.
- (iii) Students who have passed the B.Sc. Honours Examination in Chemistry as Internal Students will be exempted from the Course of Study for the Second Examination for Medical Degrees, Part I., and from that Examination.

4. In respect of the *Course for the Second Examination for Medical Degrees, Part II.*, and in respect of that *Examination*.

- (i) The Senate has power under Statutes 110 and 126 to permit, in special cases, modification of, or exemption from, the Course of Study anterior to the Second Examination for Medical Degrees, Part II., provided that an equivalent Course has been taken in the University or in a recognized Institution elsewhere.
- (ii) Students who have passed the Intermediate Examination in Medicine under former Regulations will be credited with having passed the Second Examination for Medical Degrees, Part II.
- (iii) Registered Medical Practitioners who shall have passed the First Examination for Medical Degrees and the Second Examination for Medical Degrees, Part I., may proceed to the Second Examination for Medical Degrees, Part II., and the Third Examination for Medical Degrees, without observing the intervals prescribed by the Regulations, on producing Certificates that they have gone through the required Course of Study at a School of the

University.

- (iv) Students who have passed the B.Sc. Examination with Physiology will not be required to pass the Physiological portion of the Second Examination for Medical Degrees, Part II., but Candidates who avail themselves of this exemption will not be eligible for marks of distinction.
- (v) Students who have been permitted by the Examiners to offer themselves for re-examination in one subject only at the Intermediate Examination in Medicine under former Regulations will be permitted to present themselves for examination in that subject at the Second Examination for Medical Degrees, Part II., and, if successful, will be credited with having passed that Examination.

5. In respect of the *Course* for the *Third Examination for Medical Degrees* and in respect of that *Examination*.

- (i) External Students who have passed the Second Examination for Medical Degrees may be admitted to the Third Examination for Medical Degrees as Internal Students if, subsequently to having passed the Second Examination for Medical Degrees, they become Students at a School or Schools of the University for the remainder of their Course, provided that they attend an Approved Course of Study therein, extending over three years subsequent to Matriculation, and comprising all the subjects of the Third Examination for Medical Degrees.
- (ii) See under 4 (iii) above.
- (iii) Candidates who have presented themselves for the M.B. Examination in or before May, 1904, will be exempted from presenting additional Certificates for the M.B., B.S. Degrees required under the new Regulations other than those required under the heading of Surgery, Nos. (9), (10), and (11).
- (iv) Students who have passed or entered for the Preliminary Scientific Examination, Part I, or the First Examination for Medical Degrees, in or before July, 1910, will be permitted to enter for the Third

Examination for Medical Degrees after a period of not less than two Academic Years from the date of their passing in Anatomy and Physiology at the Intermediate Examination in Medicine or at the Second Examination for Medical Degrees, Part II., provided they satisfy the Regulations in other respects.

6. In respect of the *M.D. Examination*.—Bachelors of Medicine of this University who took their degrees in or before May, 1904, will be eligible for the Doctorate even though they have not taken the B.S. Degree, and will be admissible to the M.D. Examination after the intervals prescribed by the Regulations then in force.

FIRST EXAMINATION FOR MEDICAL DEGREES.

This Examination must be taken, as a rule, not less than nine months after Matriculation. Internal Students, however, who matriculate in January will be permitted to enter for the First Examination for Medical Degrees in the following July, provided that they have attended the prescribed Course of Study for such Examination throughout the Session, and provided that they receive the approval therefor of the Governing Body of the School to which they belong, or, in the case of Students at an Institution other than a School of the University, of the recognized Teachers under whom they have studied.

Date of Examination.—The First Examination for Medical Degrees will take place twice in each year, beginning on the second Monday in July and on the first Monday following December 7th.

Every Candidate entering for this Examination must apply to the Academic Registrar for a Form of Entry and a Certificate of Course of Study, on or before May 24th for the July Examination or November 1st for the December Examination, which must be returned duly filled up and signed by or on behalf of the appropriate Teachers, accompanied by the proper Fee, not later than June 1st for the July Examination, or November 8th for the December Examination.

The Time-table of the Examination will be furnished by the Academic Registrar to each School, and to each Internal

Student not attached to a School, showing both the time and place of the Written, Practical and *viva-voce* Examinations.

Fee.—The Fee is 5*l.* for each Entry to the whole Examination. For re-examination in one subject (*see* below) the Fee is 2*l.* Students exempted from presenting themselves in one or more of the three subjects of the Examination must pay a Fee of 2*l.* in respect of each subject for which they are required to enter.

All cheques should be made payable to the University of London or Bearer, and crossed "London County and Westminster Bank, Ltd., 1, Brompton Square, S.W."

Details of Examination.—The Examination will include two papers in Inorganic Chemistry, two in Physics, and two in General Biology, three hours being allowed for each paper in each subject.

There will also be a Practical Examination not exceeding three hours in each of the following:—Inorganic Chemistry and Physics; and a Practical Examination not exceeding six hours in General Biology.

The Examiners shall be at liberty to test any Candidate by means of *viva-voce* questions.

Candidates must at their first Entry present themselves in all three subjects.

Candidates who have failed in one subject only may offer themselves for re-examination in that subject, if permitted to do so by the Examiners, upon payment of the proper Fee.

Candidates shall not be approved by the Examiners unless they have shown a competent knowledge in—

1. Inorganic Chemistry;
2. Physics;
3. General Biology.

A list of successful Candidates in alphabetical order will be published by the Academic Registrar at Two o'clock on Wednesday in the third week following that in which the Examination closes.*

* Students who have passed the First Examination for Medical Degrees will be admitted to the Scholarships Examination held annually in July; but a Student, who has completed his twentieth year on or before the 14th of June in the year of the Scholarships Examination for which he enters, will be dis-

The subject or subjects in which any successful Candidate may have distinguished himself will be shown on the list. Only those who have passed the whole Examination at one time will be eligible for marks of distinction.

A certificate, signed by the Principal and countersigned by the Academic Registrar, will be issued to each Candidate who has completed the First Examination for Medical Degrees, after the Report of the Examiners shall have been approved by the Senate.

COURSE OF STUDY FOR THE SECOND EXAMINATION FOR MEDICAL DEGREES.

This Course, which should occupy the Second Year and the first half of the Third Year of medical study, comprises the following subjects:—

Organic and Applied Chemistry.

Human Anatomy and Embryology.

Physiology.

Pharmacology (including Pharmacy and Materia Medica).

The Course of Study in Organic and Applied Chemistry should be taken during the Second Year. The Examination in this subject, forming Part I. of the Second Examination, may be taken at any time after completing the prescribed Course, but not less than six months after the date of passing the First Examination.

The other subjects, viz., Anatomy, Physiology, and Pharmacology, form Part II. of the Second Examination, which should be passed at the completion of the prescribed Courses, and not less than 18 months after the date of passing the First Examination for Medical Degrees.

SECOND EXAMINATION FOR MEDICAL DEGREES, PART I.

No Candidate will be admitted to this Examination unless he has completed the Course of Study in Organic and Applied Chemistry, nor within six months of having passed the First Examination for Medical Degrees.

Date of Examination.—This Examination will take place qualified if he passed the First Examination for Medical Degrees earlier than June of the previous year. Particulars of the Scholarships Examination will be found in the Scholarships Pamphlet, obtainable post free on application to the University.

twice* in each year, beginning on the Wednesday following the third Monday in March, and on the afternoon of the Thursday following the second Monday in July.

Every Candidate entering for this Examination must apply to the Academic Registrar for a form of Entry and a Certificate of Course of Study on or before February 8 for the March Examination, *or* on or before May 24, for the July Examination, which must be returned duly filled up and signed by or on behalf of the appropriate Teachers, and accompanied by the proper Fee, not later than February 15 for the March Examination *or* June 1 for the July Examination.

The Time-table of the Examination will be furnished by the Academic Registrar to each School, and to each Internal Student not attached to a School, showing both the time and place of the Written, Practical and *vivâ-voce* Examinations.

Fee.—The Fee is 2*l.* for the first and each subsequent Entry.

All cheques should be made payable to the University of London or Bearer, and crossed "London County and Westminster Bank, Ltd., 1, Brompton Square, S.W."

Details of Examination.—The Examination will include one paper of three hours in Organic and Applied Chemistry and a Practical Examination of three hours.

The Examiners shall be at liberty to test any Candidate by means of *vivâ-voce* questions.

A special mark will be placed against the names of those Candidates who have distinguished themselves in the Examination.

At 2 o'clock on Wednesday in the third week following that in which the Examination closes, the Academic Registrar shall publish a list of successful Candidates, in alphabetical order.

SECOND EXAMINATION FOR MEDICAL DEGREES, PART II.

No Candidate will be admitted to this Examination unless he has completed the prescribed Courses of Study in Anatomy, Physiology and Pharmacology, including Pharmacy and Materia Medica, and has passed the First Examination for

* During the continuance of the War only, the Examination will be held in December as well as in March and July.

Medical Degrees at least 18 months previously and has passed Part I. of the Second Examination for Medical Degrees.

Date of Examination.—The Second Examination for Medical Degrees, Part II., will take place twice in each year, beginning on the third Monday in March and on the first Monday in July.

Every Student entering for this Examination must apply to the Academic Registrar for a Form of Entry and a Certificate of Course of Study on or before February 1 for the March Examination *or* on or before May 17 for the July Examination, which must be returned duly filled up and signed by or on behalf of the appropriate Teachers, accompanied by the proper Fee, not later than February 15 for the March Examination *or* June 1 for the June Examination.

The Time-table of the Examination, showing both the time and place of the Written, Practical, and *vivâ-voce* Examinations, will be furnished by the Academic Registrar to each School of the University.

*Fee.**—The Fee* is 8*l.* for each entry to the whole Examination. For re-examination in Pharmacology the Fee† is 4*l.* For re-examination in Anatomy and Physiology the Fee is 6*l.*

Details of Examination.—Candidates will be examined in the following subjects:—Anatomy, Physiology, and Pharmacology, including Pharmacy and Materia Medica.

The Examination in Anatomy will consist of:—

Two papers.

A Practical Examination, consisting of an Examination on freshly dissected parts.

An Oral Examination.

The Examination in Physiology will consist of:—

Two papers.

A Practical Examination not exceeding six hours in

* Except in the case of Candidates who entered for and failed either to present themselves or to pass an Intermediate Examination in Medicine in or before July 1903. For information with regard to the Fee payable by such Candidates, application must be made to the Academic Registrar.

† The Fee of 4*l.* for re-examination will also apply to any Candidates permitted before 1915 under former Regulations to enter for re-examination in either Anatomy or Physiology only.

length, including :—

(a) *Histology*.—Preparation of specimens of normal tissues, either fresh or previously prepared, so as to demonstrate their minute structure. Application of the commoner histological methods. Recognition and description, with diagrams, of microscopic preparations of any normal tissue.

(b) *Experimental and Chemical Physiology*.—Candidates will be expected to show their acquaintance with the subjects forming their practical course, and to carry out such chemical manipulations or simple experiments as are there laid down.

The Examination in Pharmacology, including Pharmacy and Materia Medica, will consist of:—

One paper.

An Oral Examination which may include the recognition of the more important substances in the British Pharmacopœia.

The Examiners shall be at liberty to test any Candidate by means of *vivâ-voce* questions.

Candidates shall not be approved by the Examiners unless they have shown a competent knowledge in each of the subjects of the Examination.

At 2 o'clock on the Saturday in the second week following that in which the Examination closes, the Academic Registrar shall publish a list of successful Candidates in alphabetical order.

The subject or subjects in which any successful Candidate may have distinguished himself will be shown on the list.* Only those who have passed the whole Examination at one time will be eligible for marks of distinction.

Students are required to pass in Anatomy and Physiology at one and the same Examination. Students who pass in Pharmacology and fail in Anatomy or Physiology, or in both subjects, may, with the approval of the Examiners, be credited with success in Pharmacology alone and in that case will not be required to present that subject again. Students who pass in Anatomy and Physiology and fail in Pharmacology may,

* Candidates distinguished in Physiology will be excused this subject at the B.Sc. (Pass) Examination.

with the approval of the Examiners, present themselves for re-examination in Pharmacology only, upon payment of the proper Fee.

Candidates who have passed the Second Examination for Medical Degrees, Parts I. and II., may enter in the following year for the degree of B.Sc. (Honours) in Chemistry or Physiology, or Human Anatomy and Morphology, provided they have completed a Course of Study approved for that Examination in a School of the University or under a recognized Teacher.

A Certificate, signed by the Principal and countersigned by the Academic Registrar, will be issued to each Candidate who has completed to the Second Examination, Parts I. and II., after the Report of the Examiners shall have been approved by the Senate.*

COURSE OF STUDY FOR THE THIRD EXAMINATION FOR MEDICAL DEGREES,
OR M.B., B.S. EXAMINATION.

This Course of Study, which normally extends over three years, includes Medicine, Surgery, Midwifery and Diseases of Women, Pathology, Forensic Medicine and Hygiene.

The whole of the Course, except the Course of Instruction in Therapeutics (*see* 6 below) must be taken subsequently to passing in Anatomy and Physiology, at the Second Examination for Medical Degrees, Part II.†‡

* The Reports on the July Examination cannot be laid before the Senate until towards the end of October. The Certificates both for the March and the July Examinations will, in the absence of any request to the contrary, be posted to the addresses given by the Candidates on their Forms of Entry.

† During the continuance of the War, Students who have not passed the Second Examination for Medical Degrees in Anatomy and Physiology, but who completed one year's study after passing the First Examination for Medical Degrees, will be allowed to count not more than six months' service as Clinical Clerk or not more than six months' service as Surgical Dresser in a recognized Hospital as if they had so passed the examination in question.

‡ Clinical service during the continuance of the War, for any period of not more than twelve months in a medical Unit of the Regular or Territorial Forces, or in a Hospital or detachment of the Red Cross Society or in any Hospital recognized by the military or naval authorities for War purposes, will be accepted by the University as equivalent to the medical and surgical practice in a recognized Hospital for an equal period; and further, any portion or the whole of the time so spent will be accepted as equivalent to time spent

The *Curriculum* is as follows :—

Medicine.

(1) A course of lectures on the Principles and Practice of Medicine extending over a period of six months.

(2) A course (of not less than 20 demonstrations) on Clinical Methods, Physical Diagnosis and the use of instruments of observation.

(3) Attendance upon the medical practice of a School of the University during two years with clinical instruction and lectures in Clinical Medicine, and experience as Clinical Clerk for six months during this period.† [Note.—In and after 1916, the words “in the wards” will be inserted after the words “Clinical Clerk” in the foregoing paragraph.]

(4) A two months' course of instruction at a recognized Fever Hospital.† ‡ § (See notes † ‡ on p. 407.)

(5) A course of at least eight lectures on Insanity with eight clinical demonstrations at a recognized Asylum.§

(6) A course of instruction in Therapeutics (which may be taken either previously or subsequently to the Second Examination for Medical Degrees, Part II.).

(7) A course of instruction in Vaccination. The Certificate in this subject must state that the person signing it is an Authorized Vaccinator approved by the Local Government Board.

Surgery.

(8) A course of lectures on the Principles and Practice of Surgery, extending over a period of six months.

(9) Courses of instruction in Operative Surgery, Surgical Anatomy, Practical Surgery and the Administration of Anæsthetics.

(10) Attendance upon the surgical practice of a School of the University during two years with clinical instruction and either as a Clinical Clerk or as a Dresser, at the choice of the Candidate.

Clinical service during the continuance of the War, as set forth above will be similarly accepted for a period not exceeding six months from students who have not passed the Second Examination for Medical Degrees in Anatomy and Physiology, but who have completed one year of study after passing the First Examination for Medical Degrees, as if they had so passed the examination in question.

§ For lists of recognized Fever Hospitals and Asylums, see p. 434.

lectures on Clinical Surgery and six months' practice as Dresser during that period.† ‡ (See footnotes on p. 407.)

(11) Instruction in diseases of the Eye, Ear, Throat and Skin.

Midwifery and Diseases of Women.

(12) A course of lectures on Midwifery and Diseases of Women, extending over a period of three months; such lectures to be in addition to clinical instruction in the Wards or Out-Patient Room.

(13) A course of demonstrations in Practical Midwifery.

*(14) The conduct, subsequent to attendance at a course of demonstrations under (13) above, and to experience as Medical Clinical Clerk during six months and as Surgical Dresser during other six months, of at least 20 labours.†

*(14A) Experience as Clinical Clerk in the Gynæcological Wards or Out-Patient Department of a recognized Hospital during three months.

Pathology.

(15) A course of instruction in General Pathology, Morbid Anatomy, Bacteriology and Chemical Pathology, including practical work extending over not less than six months in the last-named three subjects.

(16) Attendance in the Post-mortem Room, including the performance of the duties of Post-mortem Clerk for not less than three months, and practical experience in making post-mortem examinations.

Forensic Medicine.

(17) A course of instruction in Forensic Medicine, including demonstrations, extending over a period of not less than three

* For Students who passed the Intermediate Examination in Medicine before July, 1908, the requirement corresponding to (14) and (14A) above will be as follows:—

(14) The conduct of (a) at least twenty Labours and (b) Practice for not less than two months as a Clinical Clerk in a Gynæcological Ward or Out-Patient Room.

Certificates with regard to the conduct of Labours will be received from any legally qualified Practitioner in Medicine.

† Certificates with regard to the conduct of Labours will be received from the Dean of a recognized Medical School or Authorized Member of the Staff of a recognized Hospital.

months.

Hygiene.

(18) A course of instruction in Hygiene including demonstrations extending over a period of not less than three months.

The foregoing Course of Study will be concluded by the Third Examination for Medical Degrees or M.B., B.S. Examination.

THIRD EXAMINATION FOR MEDICAL DEGREES OR M.B., B.S. EXAMINATION.

No Candidate will be admitted to this examination unless he has completed the Second Examination for Medical Degrees, together with the Course of Study set out above, nor within three years from the date of passing the Second Examination, Part II., in Anatomy and Physiology.

Bachelors of Medicine of this University who graduated in or before May, 1904, may obtain the B.S. Degree by following the Courses (9), (10) and (11) in Surgery,* and by passing the Examination in Surgery at the M.B., B.S. Examination. The Fee payable by such Candidates will be 5*l.* for each entry to the Examination.

Date of Examination.—The M.B., B.S. Examination will be held twice in each year, beginning on the fourth Monday in October and the first Monday in May.

Every Student entering for this Examination must apply to the Academic Registrar for a Form of Entry and a Certificate of Course of Study, on or before September 21st or March 24th, which must be returned duly filled up and signed by or on behalf of the appropriate Teachers, accompanied by the proper Fee, not later than September 28th for the October Examination or April 1st for the May Examination.

The Time-table of the Examination showing both the time and place of the Written, Practical, and *vivâ-voce* Examinations will be furnished by the Academic Registrar to each School of the University.

Fee.—For each Entry to the whole Examination the Fee is 10*l.* For examination or re-examination in either Group the Fee is 5*l.*†

* These Courses must have been taken subsequently to October, 1900.

† *Return of Examination Fees.*—The Fees of Candidates who withdraw before the last day of entry for any Examination will be returned to them.

A Candidate whose name has not been so withdrawn, but who does not

The Fee for each Student who is a Bachelor of Medicine in this University and is entering for the B.S. Degree will be 5*l.* for each entry to the Examination in Surgery.

All cheques should be made payable to the University of London or Bearer, and crossed "London County and Westminster Bank, Ltd., 1, Brompton Square, S.W."

Details of Examination.—Candidates will be examined in the following subjects;—Medicine (including Therapeutics and Mental Diseases), Pathology, Forensic Medicine and Hygiene, Surgery, Midwifery and Diseases of Women.

The subjects may be divided into two Groups: Group I., comprising Medicine, Pathology, Forensic Medicine and Hygiene, and Group II., comprising Surgery and Midwifery and Diseases of Women. Either Group may be taken first at the option of the Candidate, or the Groups may be taken together.

Candidates who fail in either Group may be re-examined in that Group at any subsequent Examination on payment of the proper Fee.

At the M.B., B.S. Examination to be held in October, 1915, Students will be permitted to base their replies either on the old or on the new edition of the Pharmacopœia provided that that they shall be required to state on which edition such replies are based. For Examinations in and after May, 1916, replies must be based on the new edition of the Pharmacopœia.

Group I.

The Examination in Medicine will consist of;—

- (a) Two papers, each of three hours' duration (including questions in Therapeutics, and Mental Diseases).
- (b) A clinical examination in Medicine consisting of the following:—

- (i) An examination of a patient and written

present himself for the Examination for which he has entered, will be allowed to enter for the next Examination of the same kind on payment of half the ordinary Fee; provided that, if the ordinary Fee exceed 5*l.*, the Fee for entering for the next Examination of the same kind shall be 2*l.* 10*s.*

[Candidates who retire after having presented themselves for an Examination, or who fail to pass, will be required to pay the full Fee when they next present themselves for such Examination.]

report thereon for which one hour and a half will be allowed.

(ii) An oral examination on a case or cases.

(c) An oral examination.

No Candidate will be approved in this Subject who does not satisfy the Examiners both in the papers and in the practical portion of the Examination. (The practical portion shall be understood to comprise the Case Report and the Clinical Oral and *vivâ-voce* Examinations.)

The Examination in Pathology will consist of :—

(a) One paper of three hours' duration. [The questions will embrace the subjects of General Pathology (including Elementary Chemical Pathology), Morbid Anatomy, Morbid Histology and Bacteriology.]

(b) A practical examination, for which three hours shall be allowed, on material illustrating morbid conditions of Blood, Gastric or intestinal contents, Urine, Hair ; and on Pus, Sputum, and Exudates and the more common Animal and Vegetable Parasites, and on the recognition (with short written description) of microscopic specimens.

(c) An oral examination.

The Examination in Forensic Medicine and Hygiene will consist of :—

(a) A paper of three hours' duration.

(b) An oral examination, including questions on specimens and appliances.

Group II.

The Examination in Surgery* will consist of :—

(a) Two papers, each of three hours' duration, one in Surgery and one in Surgical Anatomy and Pathology.

(b) A clinical examination on cases.

(c) An oral examination on Surgical Pathology.

(d) An oral examination on Surgical appliances, on the application of splints and bandages, and the

* Candidates for the B.S. Degree who have already taken the M.B. Degree in or before May, 1904, are required to present themselves for the Examination in Surgery only.

marking out of operative procedures and points in Surgical Anatomy on the living model.

The Examination in Midwifery and Diseases of Women will consist of :—

(a) A paper of three hours' duration.

(b) An oral examination, including questions on specimens and appliances.

Candidates shall not be approved by the Examiners in either groups of subjects unless they have shown a competent knowledge in all the subjects of the Group.

There will be no separate Examination held for Honours.

A provisional list of Candidates who have passed in both Groups will be published by the Academic Registrar at two o'clock on the Saturday in the week following that in which the examination closes. The list will be published in alphabetical order in two parts, as follows :—

1. An Honours List.

2. A Pass List.

Only those who have passed the whole Examinations at one time will be eligible for Honours.

In the Honours List the subject or subjects in which the successful Candidates have distinguished themselves will be shown on the List.

The Examiners will be empowered to recommend the award of a University Medal, of the value of 5*l.*, to the Candidate who has most distinguished himself in the whole Examination.

A supplementary list will be issued of those who have passed in one group only.

A Diploma for the Degrees of Bachelor of Medicine and Bachelor of Surgery, under the seal of the University, and signed by the Chancellor, will be delivered to each Candidate who has passed in both Groups of the Examination after the Report of the Examiners shall have been approved by the Senate.

A Diploma for the Degree of Bachelor of Surgery, under the Seal of the University, and signed by the Chancellor, will be delivered, after the Report of the Examiners shall have been

approved by the Senate, to each Candidate who, having obtained the Degree of Bachelor of Medicine in this University in or before May, 1904, shall have passed the Examination in Surgery at the M.B., B.S. Examination.

DOCTOR OF MEDICINE (M.D.).

Every Candidate for the Degree of Doctor of Medicine must have taken the Degrees of Bachelor of Medicine and Bachelor of Surgery in this University not less than two years previously, except as provided below.

Bachelors of Medicine of this University who took their Degree in or before May, 1904, will be eligible for the Doctorate, even though they have not taken the B.S. Degree, and will be admissible to the M.D. Examination after the intervals then in force.

Date of Examination.—The Examination for the Degree of Doctor of Medicine will be held twice in each year, beginning on the first Monday in December and on the first Monday in July.

In Branches I. and IV. Candidates (other than those who present a Thesis) for the July Examination must apply to the Academic Registrar for Forms of Entry on or before May 20th, which must be returned not later than June 1st; and Candidates (other than those who present a Thesis) for the December Examination must apply for Forms of Entry on or before October 20th, which must be returned not later than November 1st. The corresponding dates for application for, and return of, Forms of Entry for Candidates in Branches II, III, V, and VI, and Candidates in other Branches who present a Thesis, are April 20th and May 1st for the July Examination; and September 20th and October 1st for the December Examination. Forms of Entry must be returned duly filled up, accompanied by the proper Fee, and Certificates, as enumerated below, for the Branch concerned.

Fee.—Every Candidate for the M.D. Degree must pay a fee of 20*l.* to the Academic Registrar for the first entry to the Examination. The Fee for re-examination is 10*l.**

* Except in the case of Candidates who entered for the first time in or previously to 1903. For information with regard to the Fee for re-examination payable by such Candidates, application must be made to the Academic Registrar.

The Fee payable by Doctors of Medicine of this University on entry to a second branch of the M.D. examination is 10*l*.

Details of Examination and of Certificates to be presented by Candidates.—Candidates may present themselves for examination in one of the following branches (I) *Medicine*, (II.) *Pathology*, (III) *Mental Diseases*, (IV) *Midwifery and Diseases of Women*, (V) *State Medicine*, (VI) *Tropical Medicine*.

In the essay paper forming part of the examination in the several branches, the candidate will be expected to set forth his ideas in a clear and orderly manner, and to examine critically the various views and suggestions that have been put forward with regard to the subject selected. Account will be taken, not only of knowledge of detail, but also of the power to construct a lucid and well co-ordinated essay.

Candidates who have passed, or presented themselves for the M.D. examination in one branch may present themselves for examination in another branch at a subsequent examination.

Doctors of Medicine in any branch who present themselves for examination for the M.D. degree in a further branch will be exempted from one of the two papers in medicine if they present themselves in Branch I or from the paper in medicine if they present themselves in any other branch.

Statute 129 applies to a student who has taken the M.B. degree previous to October, 1904, or the M.B., B.S. degrees, as an external student, and is desirous of proceeding to the M.D. degree as an internal student.

Branches I-IV.

Candidates presenting themselves for the M.D. examination in Branches I-IV must have taken the M.B., B.S. degrees not less than two years previously, unless specially exempted under Clause A. below.

They must send to the Academic Registrar, together with their Form of Entry, a certificate* *either*

* Candidates entering for the Examination under Statute 129 will also be required to send in a Certificate of having completed the prescribed Course of Study.

- (i) of having been engaged in professional practice for not less than five years; *or*
- (ii) in the case of Branch I, of having held for at least six months an approved appointment* at a hospital recognized for the purpose, subsequently to having obtained a registrable qualification to practise medicine; *or*
- (iii) in the case of Branch II, of having held for at least six months an approved Pathological Appointment at an institution recognized for the purpose,† subsequently to having obtained a registrable qualification to practise medicine;
- (iv) in the case of Branch III, of having held for a period of six months an appointment in an Asylum approved for this purpose by the University‡; *or*
- (v) in the case of Branch IV, of having held for at least six months an approved appointment* in Obstetrics or Gynæcology at a hospital recognized for the purpose, subsequently to having obtained a registrable qualification to practise medicine.

A. Candidates who have *either*

- (i) Taken the M.B., B.S. Degrees with Honours, in the Branch in which they present themselves for the M.D. Examination; *or*
- (ii) Subsequently to taking the M.B., B.S. Degrees conducted a piece of original work approved for the purpose by the University; ‡ *or*
- (iii) Subsequently to taking the M.B., B.S. Degrees had such exceptional experience in the Branch in which they present themselves as may be approved by the University; ‡

may present themselves for the M.D. Examination after an

* A List of these appointments may be obtained on application to the Academic Registrar. A temporary commission held during the continuation of the War either in the Royal Army Medical Corps or the Royal Naval Service will be considered as equivalent to an approved appointment for Branch I for the purpose of this Regulation.

† For List of approved Hospitals and Asylums, *see* p. 435.

‡ Applications under this Section must reach the University not later than three months before the first day of the Examination.

interval of one year only from the time of taking the M.B., B.S. Degrees, provided that they comply in other respects with the conditions stated in the preceding paragraphs.

The Examination in Branches I-IV will consist of :—

Branch I.—Medicine.

Two papers in Medicine (one of which may be a case for commentary).

One paper in Pathology.

An Essay on one of two subjects in Medicine including the History of Medicine.

A clinical examination.

Branch II.—Pathology.

Two papers in Pathology.

One paper in Medicine.

An Essay on one of two subjects in Pathology.

A laboratory examination.

Branch III.—Mental Diseases and Psychology.

One paper or case for commentary in Mental Diseases.

One paper in Psychology.

One paper in Medicine.

An Essay on one of two subjects in Mental Diseases.

A clinical examination.

Branch IV.—Midwifery and Diseases of Women.

Two papers in Midwifery and Diseases of Women (one of which may be a case for commentary).

One paper in Medicine.

An Essay on one of two subjects in Midwifery and Diseases of Women.

A clinical examination.

In each Branch the Examiners may submit any Candidate to a *vivâ-voce* Examination.

Branch V.—State Medicine.

Candidates presenting themselves for the M.D. Degree in State Medicine must have taken the M.B., B.S. Degrees not less than two years previously, unless specially exempted under Clause A. below.

They must send to the Academic Registrar with their

Forms of Entry Certificates*

- (i) of having, subsequently to having obtained a registrable qualification to practise Medicine, attended a course of practical instruction in a laboratory or laboratories, British or Foreign, approved by the University, in which Chemistry, Bacteriology, and the Pathology of the Diseases of Animals transmissible to Man are taught ; such course to extend over a period of not less than six months and to consist of at least 240 hours of which not more than one-half shall be devoted to practical Chemistry.
- (ii) *Either* of having, subsequently to having obtained a registrable qualification to practise Medicine, during six months (of which at least three months shall be distinct and separate from the above-mentioned period of laboratory instruction) been diligently engaged on not less than 60 working days in acquiring a practical knowledge of the duties, routine and special, of Public Health Administration under the supervision of a person recognized by the University as entitled to grant certificates.†

* Candidates entering for this Examination under Statute 129 will also be required to send in a Certificate of having completed the prescribed Course of Study.

† Certificates will be accepted as follows:—

- (a) In England and Wales from the Medical Officer of Health of a County or of a single or combined Sanitary District having a population of not less than 50,000, or from a Medical Officer of Health devoting his whole time to Public Health work ; *or*
- (b) In Scotland from a Medical Officer of Health of a County or Counties, or of one or more Sanitary Districts having a population of not less than 30,000 ; *or*
- (c) In Ireland from a Medical Superintendent Officer of Health of a District or Districts having a population of not less than 30,000 ; *or*
- (d) In the British Dominions outside the United Kingdom, from a Medical Officer of Health of a Sanitary District having a population of not less than 30,000, who himself holds a registrable Diploma in Public Health ; *or*
- (e) From a Medical Officer of Health who is also a Teacher in the Department of Public Health of a recognized Medical School ; *or*
- (f) From a Sanitary Staff Officer of the Royal Army Medical Corps having charge of an Army Corps, District, Command, or

Or of having held for a period of not less than three years an appointment as Medical Officer of Health of a Sanitary District within the British Dominions, and having a population of not less than 15,000.

- (iii) of having, subsequently to having obtained a registrable qualification to practise Medicine, attended at least twice weekly during a period of not less than three months the practice of a Hospital for Infectious Diseases, at which opportunities are afforded for the study of Methods of Administration.*

A. Candidates who have *either*

- (i) taken the M.B., B.S. Degrees with Honours in Forensic Medicine and Hygiene; *or*
 (ii) subsequently to taking the Degrees of M.B., B.S., conducted a piece of original work approved for this purpose by the University†; *or*

Division recognized for this purpose by the General Medical Council.

* * The certificate of an Assistant Medical Officer of Health of a County or of a single Sanitary District having a population of not less than 50,000 may be accepted as evidence, provided the Medical Officer of Health of the County or District in question permits the Assistant Officer to give the necessary instruction and to issue certificates.

The period of six months, including attendance on not less than 60 working days, may be reduced to a period of three months, including attendance on not less than 30 working days (which shall be distinct and separate from the period of laboratory instruction) in the case of any Candidate who produces evidence that he has during three months attended either a course or courses of instruction in sanitary law, vital statistics, epidemiology, school hygiene, and other subjects bearing on Public Health Administration, given by a Teacher or Teachers in the Department of Public Health of a Medical School recognized by the University; or been a resident Medical Officer in a Hospital for Infectious Diseases containing not less than 100 beds.

* Methods of Administration shall include the methods of dealing with patients at their admission and discharge, as well as in the wards, and the Medical Superintendence of the Hospital generally.

In the case of a Medical Officer of the Royal Army Medical Corps a certificate from a Principal Medical Officer under whom he has served, stating that he has during a period of at least three months been diligently engaged in acquiring a practical knowledge of Hospital Administration in relation to infectious diseases, may be accepted as evidence under (iii) above.

† Applications under this Section must reach the University not later than three months before the first day of the Examination.

- (iii) subsequently to taking the Degrees of M.B., B.S., had such exceptional experience as may be approved for this purpose by the University,*

may present themselves for the M.D. Examination in Branch V, after an interval of one year only from the time of taking the M.B., B.S. Degrees provided that they comply in other respects with the conditions stated in the preceding paragraphs.

The Examination in Branch V will consist of:—

One paper in State Medicine, including Hygiene and School Hygiene.

One paper in State Medicine, including Forensic Medicine.

One paper in Medicine.

An Essay on one of two subjects in State Medicine.

A Practical Examination extending over not less than two and a half days; of this, one and a half days at least will be devoted to practical work in a Laboratory, of which not less than three hours will be given to (a) Bacteriology, and not less than six hours to (b) Chemistry, and one day at least will be devoted to practical examination in, and reporting on, subjects which fall within special outdoor duties of a Medical Officer of Health.

No Candidate shall be allowed to pass the M.D. Examination in State Medicine who does not satisfy the Examiners both in the Papers and in the Practical portion of the Examination.

The Examiners may submit any Candidate to a *viva-voce* Examination.

Branch VI.—Tropical Medicine.

Candidates presenting themselves for the M.D. Examination in Tropical Medicine must have taken the M.B., B.S. Degrees not less than two years previously unless specially exempted under Clause A. below. They must send to the Academic Registrar together with their Form of Entry a

Applications under this Section must reach the University not later than three months before the first day of the Examination.

Certificate* *either*

- (1) of having, subsequently to taking the M.B., B.S. Degrees, attended a complete Course, theoretical and practical, in Tropical Medicine, extending over not less than one Academic Year, at an approved School of Tropical Medicine, to the satisfaction of the Authorities of that School†; *or*
- (2) of having been engaged, subsequently to taking the M.B., B.S. Degrees, for not less than two years in hospital, official or private practice in regions where Tropical Diseases prevail.

A. Candidates who have *either*

- (i) subsequently to taking the M.B., B.S. Degrees, conducted a piece of original work, approved for the purpose by the University†; *or*
- (ii) subsequently to taking the M.B., B.S. Degrees, had such exceptional experience as may be approved by the University,†

may present themselves for the M.D. Examination after an interval of one year only from the time of taking the M.B., B.S. Degrees, provided that they comply in other respects with the conditions stated in the preceding paragraph.

The Examination in Branch VI will consist of:—

One paper in Medicine.

One paper in Tropical Medicine (including general and operative treatment).

One paper in the Pathology of Tropical Diseases and in Tropical Hygiene. *

An Essay on one of two subjects in Tropical Medicine (including Pathology and Hygiene).

A Clinical Examination.

A Laboratory Examination

The Examiners may submit any Candidate to a *viva-voce* Examination.

* Candidates entering for this Examination under Statute 129 will also be required to send in a Certificate of having completed the prescribed Course of Study. For List of approved Schools, *see* p. 438.

† Applications under this Section must reach the University not later than three months before the first day of the Examination.

For Examinations in the Years 1915 and 1916.—Any Candidate for the M.D. Degree may transmit to the Academic Registrar *not less than two months* before the commencement of the Examination a Thesis* or published work embodying the result of his own independent research and having definite relation to the Branch of Medicine in which he is a Candidate. The Candidate must indicate in what respects his Thesis or Research appears to him to advance medical knowledge or practice. The Candidate is also invited to submit in support of his candidature any printed contribution or contributions to the advancement of Medical or Surgical Science which he may have published independently or conjointly. In Branches I (Medicine), III (Mental Diseases and Psychology) and IV (Midwifery and Diseases of Women) if the Thesis or published work be judged of sufficient excellence by the Examiners, the Candidate may be exempted from a part or from the whole of the written Examination in that subject. In Branch II (Pathology) if the Thesis or published work be judged of sufficient excellence by the Examiners, he may be exempted from the practical as well as from the written part of the Examination. In Branch V (State Medicine) if the Thesis or published work be judged of sufficient excellence by the Examiners, the Candidate may be exempted from part or the whole of the written and of the practical portions of the Examination. In Branch VI (Tropical Medicine) if the Thesis be judged of sufficient merit by the Examiners, he may be exempted only from the paper in Medicine and the Essay. In every Branch, should the Thesis or published work be judged of sufficient merit by the Examiners, a Candidate who has passed the M.B. Examination not less than ten years previously may be exempted from the paper or papers, as the case may be, on Medicine.

A Candidate will not be permitted to submit as his Thesis a Thesis for which a Degree has been conferred on him in this or in any other University, but a Candidate shall not be precluded from incorporating work which he has already sub-

* The Candidate must furnish not less than four copies of the Thesis or published work submitted to the Examiners. Any Thesis approved by the University for this Degree and subsequently published must bear the following inscription on the title page:—"Thesis approved for the Degree of Doctor of Medicine in the University of London."

mitted for a Degree in this or in any other University in a Thesis covering a wider field, provided that he shall indicate on his Form of Entry and also on his Thesis any work which has been so incorporated.

If the Thesis or published work be approved by the Examiners, the Candidate will be required to present himself at the University upon such day or days as may be notified to him, and shall be further tested either orally or practically or by both of these methods at the discretion of the Examiners with reference both to the special subject selected by him and to the Thesis. A Candidate for the M.D. Degree in the Branch of Pathology, who presents a Thesis, may be required by the Examiners to submit within a given period a reasoned Report on a subject prescribed by them.

Any Thesis or published work submitted for the M.D. Degree must be satisfactory as regards literary presentation, as well as in other respects, and, if not already published in an approved form, must be submitted in a form suitable for publication.

A provisional list of successful Candidates in alphabetical order will be published by the Academic Registrar at Two o'clock on the Saturday in the second week following that in which the Examination closes.

If, in the opinion of the Examiners, sufficient merit be evinced, a University Medal, of the value of 20*l.*, will be awarded in each of the Branches I to VI to the Candidate, whether Internal or External, who shall have passed with the greatest distinction.*

A Diploma under the Seal of the University and signed by the Chancellor shall be delivered to each Candidate who has passed, after the Report of the Examiners shall have been approved by the Senate.

For Examinations in and after the Year 1917.—Any Candidate for the M.D. Degree may transmit to the Academic or External) Registrar together with his Form of Entry and the certificate referred to above not less than two

* Candidates who have already taken the M.D. Degree in one Branch and who are exempted on this account from a paper in Medicine will be at no disadvantage in respect of the award of the Gold Medal for the Branch for which they present themselves.

months before the commencement of the Examination a Thesis,* embodying the result of his own independent research and having definite relation to the Branch of Medicine in which he is a Candidate. The Candidate must indicate in what respects his Thesis appears to him to advance medical knowledge or practice. A Candidate submitting a Thesis is also invited to submit in support of his candidature as supplementary documents any printed contributions to the advancement of Medical or Surgical Science which he may have published independently or conjointly. In Branches I (Medicine), III (Mental Diseases and Psychology), IV (Midwifery and Diseases of Women), and V (State Medicine) if the Thesis be judged of sufficient excellence by the Examiners, the Candidate may be exempted from a part or from the whole of the written Examination in that subject. In Branch II (Pathology) if the Thesis be judged of sufficient excellence by the Examiners, he may be exempted from the practical as well as from the written part of the Examination. In Branch VI (Tropical Medicine) if the Thesis be judged of sufficient merit by the Examiners, he may be exempted only from the paper in Medicine and the Essay. In every Branch, should the Thesis be judged of sufficient merit by the Examiners, a Candidate who has passed the M.B., B.S. Examination not less than 10 years previously may be exempted from the paper or papers, as the case may be, on Medicine.

A Candidate will not be permitted to submit as his Thesis a Thesis for which a Degree has been conferred on him in this or in any other University, but a Candidate shall not be precluded from incorporating work which he has already submitted for a Degree in this or in any other University in a Thesis covering a wider field, provided that he shall indicate on his Form of Entry and also on his Thesis any work which has been so incorporated.

If the Thesis be approved by the Examiners, the Candidate will be required to present himself at the Uni-

* A Thesis may consist of a single paper or of a series of papers on the same subject published or unpublished, of which not less than four copies must be furnished. Any Thesis approved by the University for this degree and subsequently published must bear the following inscription on the title page:—
"Thesis approved for the Degree of Doctor of Medicine in the University of London."

versity upon such day or days as may be notified to him, and shall be further tested either orally or practically or by both of these methods at the discretion of the Examiners with reference both to the special subject selected by him and to the Thesis. A Candidate for the M.D. Degree in the Branch of Pathology, who presents a Thesis, may be required by the Examiners to submit within a given period a reasoned Report on a subject prescribed by them.

Any Thesis submitted for the M.D. Degree must be satisfactory as regards literary presentation, as well as in other respects, and must be submitted in a form suitable for publication.

A provisional list of successful Candidates in alphabetical order will be published by the Academic Registrar at Two o'clock on the Saturday in the second week following that in which the Examination closes.

If, in the opinion of the Examiners, sufficient merit be evinced, a University Medal, of the value of 20*l.*, will be awarded in each of the Branches I to VI to the Candidate, whether Internal or External, who shall have passed with the greatest distinction.*

A Diploma under the Seal of the University and signed by the Chancellor shall be delivered to each Candidate who has passed, after the Report of the Examiners shall have been approved by the Senate.

MASTER OF SURGERY (M.S.)

The Master of Surgery Degree is conferred in the following Branches:—Surgery (*Branch I*) and Dental Surgery (*Branch II*).

Every Candidate for the Degree of Master of Surgery must have taken the Degrees of Bachelor of Medicine and Bachelor of Surgery in this University.

Date of Examination.—The Examination for the Degree of Master of Surgery will be held twice in each year, beginning on the first Monday in December and on the first

* Candidates who have already taken the M.D. Degree in one Branch and who are exempted on this account from a paper in Medicine will be at no disadvantage in respect of the award of the Gold Medal for the Branch for which they present themselves.

Monday in July.

Every Candidate in Branch I. must apply to the Academic Registrar for a Form of Entry on or before October 20th for the December Examination, *or* May 20th for the July Examination, which must be returned duly filled up not later than November 1st for the December Examination, *or* June 1st for the July Examination, accompanied by the proper Fee and by the Certificate specified below.

Every Candidate in Branch II must apply to the Academic Registrar for a Form of Entry on or before July 20th for the December Examination, *or* February 20th for the July Examination, which must be returned, duly filled up, not later than August 1st for the December Examination, *or* March 1st for the July Examination, accompanied by the proper Fee and by the Certificate specified below.

Statute 129 applies to a Student who has taken the M.B., B.S. Degrees as an External Student, and is desirous of proceeding to the M.S. Degree as an Internal Student.

Fee.—Every Candidate for the M.S. Degree must pay a Fee of 20*l.* to the Academic Registrar for the first Entry in either Branch of the Examination. The Fee for re-examination is 10*l.**

Branch I.—Surgery.

Every Candidate for the Degree of Master of Surgery (Branch I) must have taken the Degrees of Bachelor of Medicine and Bachelor of Surgery in this University not less than two years previously, except as provided below.

Candidates who have *either*—

- (i) taken the M.B., B.S. Degrees with Honours in Surgery; *or*
- (ii) subsequently to taking the M.B., B.S. Degrees, conducted a piece of original work approved by the University;† *or*
- (iii) subsequently to taking the M.B., B.S. Degrees, had such exceptional experience as may be approved for this purpose by the University,†

* Except in the case of Candidates who entered for the first time in or previously to 1903. For information with regard to the Fee for re-examination payable by such Candidates, application must be made to the Academic Registrar.

† Applications under this Section must reach the University not later than three months before the first day of the Examination.

may present themselves after an interval of one year only from the time of taking the M.B., B.S. Degrees, provided that they comply in other respects with the conditions stated in the following paragraphs :—

Certificate.—Every Candidate must forward together with his Form of Entry a Certificate of having held for at least six months an approved surgical appointment* at a hospital recognized for the purpose, subsequently to having obtained a registrable qualification to practise medicine.†

Details of Examination.—The Examination will consist of—

Two papers in Surgery (one of which may be a case for commentary).

An essay on one of two subjects, which may be selected from any branch of Surgery.

Two papers in Surgical Pathology and Surgical Anatomy.
A clinical examination.

Operations on the Dead Body.

An oral examination at the discretion of the Examiners.

Candidates shall not be approved by the Examiners unless they have shown a competent knowledge in all the Subjects of the Examination.

Branch II.—Dental Surgery.

Every Candidate must forward together with his Form of Entry the following Certificates :—

(i) A Certificate of having spent at least three years in the study and practice of Dental Surgery at a teaching school or schools approved by the University, of which one year at least must have been subsequent to obtaining the M.B., B.S. Degrees in this University.

(ii) A certificate of having held for at least six months an approved appointment* at a dental hospital

* A list of these appointments may be obtained on application to the Academic Registrar. A temporary commission held during the continuance of the War either in the Royal Army Medical Corps or the Royal Naval Medical Service will be considered as equivalent to an approved appointment for Branch I. for the purpose of this Regulation.

† Candidates entering for this Examination under Statute 129 will also be required to send in a Certificate of having completed the prescribed Course of Study.

recognized for the purpose, subsequently to having obtained a registrable qualification to practise medicine.*

Details of Examination.—The Examination will consist of—

One paper and *vivâ-voce* examination in Oral Anatomy and Physiology and in Comparative Dental Anatomy.

One paper and *vivâ-voce* examination in Oral Surgery and Therapeutics.

One paper and *vivâ-voce* examination in Dental Metallurgy.

An essay on one of two subjects in Oral Surgery and Pathology.

One practical examination in Normal and Pathological Dental Histology.

One practical examination in Bacteriology.

A clinical and practical examination in Oral Surgery (including operative and prosthetic Dental Surgery).

Candidates shall not be approved by the Examiners unless they have shown a competent knowledge in all the subjects of the Examination.

For Examinations in the Years 1915 and 1916.—Any Candidate for the M.S. Degree may transmit to the Academic Registrar *not less than two months* before the commencement of the Examination, a Thesis† or published work embodying the result of his own independent research, and having definite relation to Surgery (Branch I), or Dental Surgery (Branch II). The candidate must indicate in what respects his Thesis or Research appears to him to advance surgical or medical knowledge or practice. The Candidate is also invited to submit in support of his candidature any printed contribution or contributions to the advancement of Surgical or Medical Science which he may have published independently or conjointly.

* Candidates entering for this Examination under Statute 129 will also be required to send in a Certificate of having completed the prescribed Course of Study.

† The Candidate must furnish not less than four copies of the Thesis or published work submitted to the Examiners. Any Thesis approved by the University for this Degree and subsequently published must bear the following inscription on the title page:—"Thesis approved for the Degree of Master of Surgery in the University of London."

If the Thesis or published work be judged of sufficient excellence by the Examiners, the Candidate may be exempted from a part or from the whole of the written Examination ; but in all cases he shall be submitted to the clinical, practical, and oral Examinations above referred to.

A Candidate will not be permitted to submit as his Thesis a Thesis for which a Degree has been conferred on him in this or in any other University, but a Candidate shall not be precluded from incorporating work which he has already submitted for a Degree in this or in any other University in a Thesis covering a wider field, provided that he shall indicate on his Form of Entry and also on his Thesis any work which has been so incorporated.

If the Thesis or published work be approved by the Examiners, the Candidate will be required to present himself at the University upon such day or days as may be notified to him, and shall be further tested either orally or practically, or by both of these methods, at the discretion of the Examiners with reference both to the special subject selected by him and to the Thesis.

Any Thesis or published work submitted for the M.S. Degree must be satisfactory as regards literary presentation, as well as in other respects, and, if not already published in an approved form, must be submitted in a form suitable for publication.

A provisional list of successful Candidates, arranged in alphabetical order, will be published by the Academic Registrar at Two o'clock on the Saturday in the second week following that in which the Examination closes.

If in the opinion of the Examiners sufficient merit be evinced, a University Medal, of the value of 20*l.*, will be awarded to each of the Candidates, whether Internal or External, in Branches I and II respectively, who shall have passed with the greatest distinction.

A Diploma under the Seal of the University and signed by the Chancellor shall be delivered to each Candidate who has passed, after the Report of the Examiners shall have been approved by the Senate.

For Examinations in and after the Year 1915.—Any Candidate for the M.S. Degree may transmit to the

(Academic or External) Registrar, together with his Form of Entry and the certificate referred to above, not less than two months before the commencement of the Examination, a Thesis * embodying the result of his own independent research, and having definite relation to Surgery (Branch I), or Dental Surgery (Branch II). The Candidate must indicate in what respects his Thesis appears to him to advance surgical knowledge or practice. A Candidate submitting a Thesis is also invited to submit in support of his candidature as supplementary documents, any printed contributions to the advancement of Surgical or Medical Science which he may have published, independently or conjointly. If the Thesis be judged of sufficient excellence by the Examiners, the Candidate may be exempted from a part or from the whole of the written Examination; but in all cases he shall be submitted to the clinical, practical and oral Examinations above referred to.

A Candidate will not be permitted to submit as his Thesis a Thesis for which a Degree has been conferred on him in this or any other University, but a Candidate shall not be precluded from incorporating work which he has already submitted for a Degree in this or in any other University in a Thesis covering a wider field, provided that he shall indicate on his Form of Entry and also on his Thesis any work which has been so incorporated.

If the Thesis be approved by the Examiners, the Candidate will be required to present himself at the University upon such day or days as may be notified to him, and shall be further tested, either orally or practically, or by both of these methods, at the discretion of the Examiners, with reference both to the special subject selected by him and to the Thesis.

Any Thesis submitted for the M.S. Degree must be satisfactory as regards literary presentation, as well as in other respects, and must be submitted in a form suitable for publication.

* A Thesis may consist of a single paper or of a series of papers on the same subject, published or unpublished, of which not less than four copies must be furnished. Any Thesis approved by the University for this Degree and subsequently published must bear the following inscription on the title page:—
"Thesis approved for the Degree of Master of Surgery in the University of London."

A provisional list of successful Candidates, arranged in alphabetical order, will be published by the Academic Registrar at Two o'clock on the Saturday in the second week following that in which the Examination closes.

If in the opinion of the Examiners sufficient merit be evinced a University Medal, of the value of 20*l.*, will be awarded to each of the Candidates, whether Internal or External, in Branches I and II respectively, who shall have passed with the greatest distinction.

A diploma under the Seal of the University and signed by the Chancellor shall be delivered to each candidate who has passed, after the Report of the Examiners shall have been approved by the Senate.

INSTITUTIONS RECOGNIZED FOR THE PURPOSES OF THE M.B., B.S. DEGREES.

I. The University receives Certificates for the complete course of Medical Education for Internal Students, including Clinical Medicine and Surgery, preparatory to the M.B., B.S. Degrees (except as hereinafter provided in special cases) from the following Institutions :—

London.

Schools of the University :—St. Bartholomew's Hospital and Medical School. St. Thomas's Hospital and Medical School. *Westminster Hospital and Medical School. Guy's Hospital and Medical School. *St. George's Hospital and Medical School. London Hospital and Medical College. Middlesex Hospital and Medical School. *Charing Cross Hospital and Medical School. Royal Free Hospital and London School of Medicine for Women. *University College Hospital and Medical School. *King's College Hospital and Medical School. St. Mary's Hospital and Medical School.

For Certificates in the subjects of the First and Second Examinations for Medical Degrees and for the Course in Hygiene :—University of London : University College. University of London : King's College.

For Certificates in Physiology only (Second Examination

* The students of this Hospital receive instruction for the First and Second Examinations at University College or King's College.

for Medical Degrees) :—Bedford College for Women.

For Certificates in Pharmacy and Materia Medica only (Second Examination for Medical Degrees) :—School of Pharmacy of the Pharmaceutical Society of Great Britain.

For Certificates in Hygiene only (M.B., B.S.) :—Royal Army Medical College.

II.—The Senate has power to grant exemptions from the Courses of Study anterior to the First and the Second Examinations for Medical Degrees in the case of Students who have pursued equivalent Courses at any of the following Institutions recognized by the Senate for this purpose with the approval of His Majesty in Council. Such Students shall be permitted to proceed to the M.B., B.S. Degrees, as Internal Students, provided that they shall have completed a Course of Study in a School of the University extending over not less than three years, and passed First, Second and Third Examinations for Medical Degrees and such other previous examinations, if any, as the Senate may in each case prescribe :—

England and Wales.

Birmingham.—The University.

Bristol.—The University.

Cambridge.—The University Medical School.

Cardiff.—University College of South Wales.

Leeds.—The University.

Liverpool.—The University.

Manchester.—The Victoria University of Manchester.

Newcastle-upon-Tyne.—The Durham University Medical School.

Oxford.—The University Medical School.

Sheffield.—The University.

Scotland.

Aberdeen.—The University.

Dundee.—University College.

Edinburgh.—The University ; the Medical School of the Royal Colleges ; the Medical College for Women.

Glasgow.—The University ; Anderson's College ; St. Mungo's College ; the Queen Margaret College (Medical School for Women).

St. Andrews.—The University, including University College, Dundee.

Ireland.

Belfast.—The Queen's University.

Cork.—University College.

Dublin.—Trinity College School of Physic; the Royal College of Surgeons (including the Carmichael and the Ledwich Schools); University College.

Galway.—University College.

British Colonies and Dominions.

Adelaide.—The University.

Bombay.—The Grant Medical College.

Calcutta.—The Bengal Medical College.

Ceylon.—The Medical College, Colombo.

Madras.—The Medical College.

Malta.—The University of Malta.

Melbourne.—The University.

Montreal.—The University of McGill College; the University of Bishop's College.

New Zealand.—The University.

Sydney.—The University.

Foreign Parts.

Austria-Hungary.—The Universities of Vienna, Graz, Innsbrück, Prag, and Budapest.

Belgium.—The Universities of Brussels, Liège, and Louvain.

Denmark.—The University of Copenhagen.

France.—The Universities of Paris, Lyons, Marseilles, Montpellier, and Toulouse; and the Medico-Pharmaceutical School of Nantes.

Germany.—The Universities of Berlin, Bonn, Erlangen, Freiburg, Göttingen, Halle, Heidelberg, Jena, Kiel, Königsberg, Leipzig, Munich, Strassburg, Tübingen, and Würzburg.

Holland.—The Universities of Amsterdam, Leyden, and Utrecht.

Italy.—The Universities of Rome, Bologna, Florence, Genoa, Milan, Naples, Pavia, Pisa, and Turin.

Norway.—The University of Christiania.

Russia.—The Universities of Petrograd, Cracow, Moscow, and Warsaw.

Spain.—The Universities of Madrid, Salamanca, and Seville.

Sweden.—The University of Upsala; the Royal Caroline Institute of Stockholm.

Switzerland.—The Universities of Berne, Basel, Geneva, Lausanne, and Zürich.

United States of America :—

New York; Columbia University; the College of Physicians and Surgeons; New York University; Bellevue Hospital Medical College; Cornell University.

The University of Pennsylvania, Philadelphia; Jefferson College, Philadelphia; Harvard University, Cambridge; Boston, Rush Medical College, Chicago; North-Western University, Chicago; the University of Michigan; Cooper Medical College, San Francisco; the University of California, San Francisco; Yale University, New Haven, Connecticut.

FEVER HOSPITALS.

The following Fever Hospitals, situated within the prescribed radius of 30 miles from the University, are recognized as Institutions at which Students may take the two-months' course of instruction prescribed in the Curriculum in Medicine (No. 4, p. 408), preparatory to the M.B., B.S. Degrees :—

Brook Hospital, Shooters Hill, Woolwich, S.E.

Eastern Hospital, The Grove, Homerton, N.E.

Fountain Hospital, Tooting Grove, Tooting Graveney, S.W.

Grove Hospital, Tooting Grove, Tooting Graveney, S.W.

London Fever Hospital, Liverpool Road, N.

North-Eastern Hospital, St. Ann's Road, South Tottenham, N.

North-Western Hospital, Lawn Road, Hampstead, N.W.

Park Hospital, Hither Green, S.E.

Plaistow Hospital, E.

South-Eastern Hospital, Avonley Road, New Cross, S.E.

South-Western Hospital, Landor Road, Stockwell, S.W.

Western Hospital, Seagrave Road, Fulham, S.W.

ASYLUMS.

The following Asylums, situated within the prescribed

radius of 30 miles from the University, are recognized as Institutions at which Students may take the course on Insanity prescribed in the Curriculum in Medicine (No. 5, p. 408), preparatory to the M.B., B.S. Degrees :—

Bethlem Royal Hospital, S.E.

Bethnal House Asylum.

Camberwell House Asylum.

City of London Asylum, Dartford, Kent.

Essex County Asylum, Brentwood.

Hertfordshire County Asylum, St. Albans.

Holloway Sanatorium Hospital for the Insane, Virginia Water.

London County Asylums :—

Banstead, Surrey ; Bexley, Kent ; Cane Hill, Coulsdon, Surrey ; Claybury, Woodford Bridge, Essex, Colney Hatch ; Hanwell ; Horton, Epsom ; Long Grove, Epsom ; and The Manor, Epsom.

Middlesex County Asylum, Upper Tooting.

Peckham House Asylum.

St. Luke's Asylum, Old Street, E.C.

Surrey County Asylum, Brookwood.

West Ham Borough Asylum, Ilford.

INSTITUTIONS RECOGNIZED FOR THE PURPOSES OF THE M.D. AND
M.S. DEGREES.

A. For the M.D. Degree in Branches I, II, and IV, and for the M.S. Degree, Certificates* can only be accepted in respect of certain approved appointments (a list of which can be obtained on application to the Academic Registrar) in the case of Students who have taken the M.B., B.S. Degrees as Internal Students.†

B. For the M.D. Degree in Branch III (Mental Diseases) the University receives Certificate of Hospital Appointments

* Certificates of Appointments presented by Candidates for the M.D. and M.S. Degrees must be signed (1) by the Secretary or other Chief Administrative Officer of the Hospital concerned, and (2) by the Medical or Surgical Officer under whose immediate direction the appointments have been held.

† In the case of Students who have taken the M.B., B.S. Degrees as External Students and are desirous of proceeding to the M.D. Degree as Internal Students under Statute 129, Certificates from the Schools of the University only can be accepted.

(which may only be held by a registered medical practitioner) in the case of Students who have taken the M.B., B.S. Degrees as Internal Students.

(i) From the Asylums enumerated above.

(ii) From the following Asylums* :—

Provincial.

Bedfordshire.—Three Counties Asylum, Arlesey, Hitchin.

Berkshire.—Wallingford.

Buckinghamshire.—Stone, Aylesbury.

Cambridgeshire.—Fulbourne.

Cheshire.—Parkside, Macclesfield ; Chester.

Cornwall.—Bodmin.

Cumberland.—Cumberland and Westmorland Counties Asylum, Carlisle.

Derbyshire.—Mickleover ; Derby Borough Asylum, Rowditch.

Devonshire.—Exminster ; Exeter City Asylum, Digbys, Heavitree ; Plymouth Borough Asylum, Ivybridge.

Dorsetshire.—Dorchester.

Durham.—Winterton.

Essex.—See p. 435.

Gloucestershire.—County Asylums, Wotton and Barnwood ; Bristol Asylum, Fishponds.

Hampshire.—Knowle ; Borough of Portsmouth Asylum ; Isle of Wight County Asylum, Carisbrooke.

Kent.—Barming Heath ; Chartham. (See also London County Asylums, p. 435.)

Lancashire.—Lancaster ; Prestwich ; Rainhill ; Whittingham ; Winwick ; Manchester Royal Asylum, Cheadle.

Leicestershire.—Leicestershire and Rutland Asylum, Leicester ; Leicester Borough Asylum, Humberstone.

Lincolnshire.—Bracebridge ; Kesteven County Asylum, Sleaford.

Norfolk.—Thorpe ; Norwich City Asylum, Hellesdon.

Northamptonshire.—Berrywood ; St. Andrew's Hospital, Northampton.

Northumberland.—Cottingwood, Morpeth ; Newcastle City Asylum.

* The Asylums are County Asylums, unless otherwise specified.

Nottinghamshire.—New County Asylum, Radcliffe-on-Trent; City Asylum, Mapperley Hill.

Oxfordshire.—Littlemore.

Shropshire.—Salop and Montgomeryshire Counties Asylum, Bicton Heath, Shrewsbury.

Somersetshire.—Somerset and Bath Asylum, Taunton; Somerset and Bath Asylum, Wells.

Staffordshire.—Stafford; Burntwood; Cheddleton.

Suffolk.—Melton Woodbridge; Ipswich Borough Asylum.

Surrey.—Earlswood Asylum, Redhill. (*See also* London County Asylums, p. 435.)

Sussex.—Brighton County Borough Asylum, Hayward's Heath; East Sussex Asylum, Hellingly; West Sussex Asylum, Chichester.

Warwickshire.—Hatton; Birmingham City Asylum, Rubery Hill; Birmingham City Asylum, Winson Green.

Wiltshire.—Devizes.

Worcestershire.—County and City Asylum, Powick.

Yorkshire.—East Riding Asylum, Beverley; North Riding Asylum, Clifton, York; South Yorkshire Asylum, Wadsley, Sheffield; West Riding Asylum, Menston, Leeds; West Riding Asylum, Wakefield; Hull City Asylum; Middlesbrough County Borough Asylum.

Channel Islands.—Jersey Asylum.

Isle of Man.—General Lunatic Asylum, Union Mills.

Wales.—Cardigan, Carmarthen, and Pembroke Joint Counties Asylum.

Scotland.

Aberdeen.—Royal Lunatic Asylum.

Ayr.—District Asylum, Glengall.

Berwick.—Roxburgh, Berwick and Selkirk District Asylum.

Cupar.—Fife and Kinross District Asylum.

Dumfries.—Crichton Royal Institution.

Dundee.—Royal Asylum.

Edinburgh.—Royal Asylum, Morningside.

Glasgow.—District Hospital for Mental Diseases, Gartloch; District Mental Hospital, Woodilee, Lenzie; Royal Asylum, Gartnavel.

Inverness.—District Asylum.

Larbert.—Stirling, Clackmannan, Dumbarton and Linlithgow District Asylum.

Lochgilphead.—Argyll and Bute District Asylum.

Montrose.—Royal Asylum (Sunnyside).

Paisley.—Govan District Asylum, Hawkhead.

Ireland.

The District Asylums of Armagh, Ballinasloe, Belfast, Carlow, Castlebar, Clonmel, Cork, Down, Dublin (Richmond Asylum), Ennis, Enniscorthy, Killarney, Kilkenny, Letterkenny, Limerick, Londonderry, Maryborough, Monaghan, Mullingar, Omagh, Sligo and Waterford.

- (iii) From other Asylums with regard to which information may be obtained on application to the Academic Registrar.

C. For the M.D. Degree in Branch V. (State Medicine), the University receives Certificates of Laboratory Instruction in the case of Students who have taken the M.B., B.S. Degrees as Internal Students,*

- (i) From the Laboratories attached to the following Institutions:—

England and Wales.

London. — University of London: University College. University of London: King's College.

Schools of the University.—St. Bartholomew's Hospital; St. Thomas's Hospital; Westminster Hospital; Guy's Hospital (for Certificates in Bacteriology and Parasitology only); St. George's Hospital; London Hospital; Middlesex Hospital; Charing Cross Hospital; St. Mary's Hospital, Paddington; Lister Institute of Preventive Medicine; Royal Army Medical College.

London.—Royal Institute of Public Health.

Birmingham.—The University.

Bristol.—University College.

Cambridge.—The University Medical School.

Cardiff.—University College of South Wales and Mon-

* In the case of Students who have taken the M.B., B.S. Degrees as External Students and are desirous of proceeding to the M.D. Degree as Internal Students under Statute 129, Certificates from the Schools of the University only can be accepted.

mouthshire.

Durham.—The College of Medicine, University of Durham.

Haslar.—The Royal Naval Hospital.

Leeds.—The University.

Liverpool.—The University.

Manchester.—The Victoria University.

Nottingham.—University College.

Oxford.—The University Medical School.

Sheffield.—The University.

Scotland.

Aberdeen.—The University.

Dundee.—The University College.

Edinburgh.—The University ; the School of Medicine of the Royal Colleges.

Glasgow.—The University ; St. Mungo's College ; Public Health Laboratory at Anderson's College, Partick.

Ireland.

Belfast.—The Queen's University.

York.—University College.

Dublin.—The School of Physic in Ireland, Trinity College ; University College.

British Colonies and Dominions.

Malta.—The University.

Montreal.—The McGill University ; the Medical Faculty of the University of Bishop's College.

(ii) From other Laboratories, with regard to which information may be obtained on application to the Academic Registrar.

D. For the M.D. Degree in Branch VI (Tropical Medicine), the University receives Certificates in the case of Students who have taken the M.B., B.S. Degrees as Internal Students.*

From the following Institutions :—

London.—The London School of Tropical Medicine (a

* In the case of Students who have taken the M.B., B.S. Degrees as External Students and are desirous of proceeding to the M.D. Degree as Internal Students under Statute 129, Certificates from the Schools of the University only can be accepted.

School of the University).

Liverpool.—The Liverpool School of Tropical Medicine.

Cairo.—School of Medicine (Kasr El-Ainy Hospital).

India.—The Hospitals attached to the Medical Colleges at Calcutta, Bombay, Madras, and Lahore. (For certificates of appointments.)

THE ROGERS PRIZE.

The Rogers Prize shall consist of a sum of 100*l.*, and shall be awarded from time to time when the interest on the trust fund shall have accumulated to allow the award. It shall be open to all persons whose names appear on the Medical Register of the United Kingdom, and shall be awarded for an Essay or Dissertation on some Medical or Surgical subject, which shall be named and appointed by the University.

Essays and dissertations shall be in English, and shall be typewritten or printed. Essays or Dissertations which are the work of two or more members of the Medical Profession will not be accepted in competition for the Prize. Each Essay or Dissertation shall have a motto or device, and shall be accompanied by a sealed paper, containing the name and residence of the author, and, having on the outside a motto or device corresponding with the motto or device on the Essay or Dissertation. The Essay or Dissertation shall be addressed to the Vice-Chancellor of the University, and shall be delivered at the University on or before 4 o'clock p.m. on the last day, other than Sunday, of April of the year in which the Prize is to be awarded.

The Prize shall not be adjudged to the Author of any Essay or Dissertation, unless the persons appointed to examine the work shall deem it worthy of the award. The Prize Essay or Dissertation, and every accompanying drawing and preparation, shall be the property of the University. Unapproved Essays or Dissertations, with the accompanying drawings and preparations, shall be returned to the authors, provided they are claimed within three months of the award of the Prize. After that period has elapsed, the University will no longer hold itself responsible for them.

In 1916, the Prize will be awarded for an Essay or Dissertation on the following subject: "The Nature of Pyrexia and its relation to Micro-Organisms."

REGULATIONS OF THE SOCIETY OF APOTHE- CARIES OF LONDON FOR THE DIPLOMA IN MEDICINE, SURGERY AND MIDWIFERY.

REGISTRABLE under the provisions of the Medical Act, 1886, and qualifying the holder to compete for appointments in the Naval, Military, and Indian Medical Services; also for Civil, Colonial and Poor Law Appointments. Regulations applicable to all Candidates who commenced Medical Study on and after January 1st 1892.

DATES OF EXAMINATIONS.

The Examinations are Primary and Final.

The Primary Examination is held quarterly, on the first Monday and on the following Wednesday and Thursday, in the months of January, April, July and October.

The Final Examination is held monthly, and consists of—

1. The Examination in Surgery on the second Monday and on the following Wednesday and Thursday.

There is no examination held in the month of September.

2. The Examination in Medicine, Forensic Medicine, and Midwifery on the third Monday and on the following Wednesday and Thursday.

There is no examination held in the month of September.

The Primary Examination.

The Examination consists of two parts, Part I. and Part II.

* PART I.—*Elementary Biology*.—*Chemistry*; the Principles of the Science which bear on the Study of Medicine. Chemical Physics including the Elementary Mechanics of Solids and Fluids, Heat, Light, and Electricity. Practical Chemistry

* Candidates may enter for Part II. of the Primary Examination before passing Part I., provided the course of study has been completed in accordance with the Regulations.

Materia Medica and Pharmacy.—A Synopsis indicating the range of the subjects in the Examination are included in the Regulations. Evidence of instruction in these subjects must be produced prior to Examination.

These subjects may be taken at separate Examinations.

Should the Candidate not succeed in passing in all the subjects of the Examination, he will be referred only in the subject or subjects in which he failed.

* PART II.—*Anatomy.—Physiology and Histology.*—This Examination cannot be passed before the completion of 12 months' Practical Anatomy with Demonstrations.

A Candidate is required to present himself for Examination in Anatomy and Physiology together until he has reached the required standard to pass in one or other of those subjects; but no Candidate will be allowed to pass in one of the subjects without obtaining at the same time a certain percentage of marks in the other subject.

Evidence must be produced of the Candidate's course of Study; a Schedule for the Primary Examination, to be obtained of the Secretary, must be signed by the Dean of the Medical School, or other authority.

Candidates will be exempt from the subjects of the Primary Examination on producing evidence that they have passed equivalent Examinations before an Examining Board recognized by the Society.

Candidates referred in Anatomy will be required to produce evidence of further work in the dissecting room before being admitted to re-examination.

The Final Examination.

SECTION I.

This Section consists of three parts.

PART I. includes:—A written examination in the Principles and Practice of Surgery, Surgical Pathology, and Surgical Anatomy, and an Oral Examination in Surgery, Surgical Pathology, Operative Manipulation, Surgical Anatomy, Instru-

* Candidates may enter for Part II. of the Primary Examination before passing Part I., provided the course of study has been completed in accordance with the Regulations.

ments, and Appliances.

PART II. includes : Written and Oral examinations in the following subjects :—(a) The Principles and Practice of Medicine, including Therapeutics, Pharmacology, and Prescriptions. Pathology and Morbid Histology; (b) Forensic Medicine, Hygiene, Theory and Practice of Vaccination; and Mental Diseases.

* PART III. includes :—Written and Oral Examination in Midwifery, Gynæcology, and Diseases of New-born Children. Obstetric Instruments and Appliances.

Parts I., II. and III., may be taken at separate Examinations, and in any order.

Candidates may also take up *a, b* in Part II. separately, but an extra re-examination fee is charged in case of failure.

Section 1 of the Final Examination may be passed any time after the necessary course of Medical study has extended over 45 months. Section 2 cannot be passed before the end of the fifth year. Section 1 must be passed before section 2.†

SECTION 2.

This Section consists of two parts.

PART I. includes :—Clinical Surgery.

PART II. includes :—Clinical Medicine, Medical Anatomy.

Candidates may enter for I. and II. together or separately.

COURSE OF MEDICAL STUDY.

Primary Examination.

The following Certificates are required to be produced prior to Part I. of the Primary Examination :

PART I.—Elementary Biology, 3 months. Chemistry and Chemical Physics, 6 months. Practical Chemistry, 3 months. Pharmacy and Dispensing,‡ 3 months.

The following Certificates are required to be produced

* Part III. may be taken with Section 2.

† Candidates may take up Section 1 and Section 2 of the Final Examination together, but Candidates are strongly advised to take these Sections separately—Section 1 at the end of the fourth year, Section 2 at the end of the fifth year.

‡ Instruction in Pharmacy and Dispensing must be given by a Registered Medical Practitioner, or by a Member of the Pharmaceutical Society by Examination, or in a Public Hospital, Infirmary, or Dispensary.

prior to Part II. of the Primary Examination :—

PART II. Anatomy, 6 months. Practical Anatomy with Demonstrations, 12 months. Physiology, 6 months. Histology with Demonstrations, 3 months.

The study of these subjects must be pursued at a Medical School recognized by the Society.

Final Examination.

SECTION I.

The following Certificates are required to be produced prior to Section I of the Final Examination :—

1. Certificate of the Course of Medical Study.
2. Evidence of having passed in all the subjects of the Primary Examination, or its equivalent.

SECTION I.

Commencement and Duration of Professional Study,*
4 Winter and 3 Summer Sessions.

Hospital Practice, Medical and Surgical, with Post-mortem Examinations,* 1 Winter and 1 Summer Session.

PART I. — Dressership,† 6 months. Clinical Surgical Lectures, 9 months. Principles and Practice of Surgery, 6 months. Practical Surgery, 3 months. Performance of Surgical Operations on the dead body.

PART II. — Clinical Clerkship,† 6 months. Clinical Medical Lectures, 9 months. Principles and Practice of Medicine, 6 months. Pathology, 3 months. Forensic Medicine, Hygiene and Insanity, 3 months.

PART III. — *Midwifery*. — Midwifery and Gynæcology, 3 months. Clinical Instruction in the same, 3 months. A course of Practical Midwifery. Attendance on 20 Midwifery cases.‡

The course of Medical Study must extend over the above-mentioned period of 45 months, and the whole Schedule I., II. and III., must be fully signed before the Candidate can enter for any part of the Examination.

* The Hospital must be in connection with a recognized Medical School.

† This office must be held at a Hospital, or other institution recognized by the Society.

‡ The Certificate of attendance on 20 Midwifery Cases must be signed by the Hospital authorities, or by a registered medical practitioner.

Final Examination.

SECTION 2.

The following Certificates are required to be produced prior to Section 2 of the Final Examination :—

SECTION 2.

SECTION 2. Attendance on the Practice of Medicine and Surgery at a Hospital or other Institution recognized by the Society for a further period of 12 months, or 6 months as above, and 6 months as a pupil of a registered practitioner holding a public medical or surgical appointment ; or attendance at 2 Special Hospitals 6 months (3 months at each Hospital), and 6 months at a General Hospital, all such Hospitals to be recognized by the Society.

Evidence of the following shall also be given, viz. :

Practical instruction in Infectious Diseases and in Mental Diseases (at a Lunatic Asylum, or in the wards of an Institution containing a special ward set apart for the treatment of mental diseases), and in any two of the following subjects :—

Ophthalmic Surgery.*

Laryngology, Rhinology, and Otology.

Dermatology.

Diseases of Children.

These Courses may be taken at a General Hospital recognized by the Society any time after the Student has held the posts of Dresser and Clinical Clerk.

The following Certificates are also required to be produced prior to Section 2 of the Final Examination :—

1. Certificate of birth. The Candidate must be
21 years of age.
2. „ of Moral Character.
3. „ of Proficiency in Vaccination, signed
by a Teacher authorized by the
Local Government Board.
4. „ of Instruction in the Administration
of Anæsthetics.

* A Certificate of having attended a course of instruction during not less than 3 months at an Ophthalmic Hospital or the Ophthalmic Department of a General Hospital (which course shall include instruction in the errors of refraction) will be necessary for admission to the Army Medical Staff.

GENERAL INSTRUCTIONS.

Candidates intending to present themselves for Examination are required to give 14 days' notice. A form for this purpose will be sent on application.

All required Certificates must be forwarded to the Secretary with the notice for examination, together with the fee.

Candidates who have passed the subjects of the Primary Examination at other Examining Boards recognized by the Society, should request the Secretary of such Board to send evidence of such Examinations passed. Only direct evidence is recognized.

The Certificates being found correct, a card to admit the Candidate to the Examination will be sent, stating the subjects of examination and the time of attendance.

No Candidate is eligible for the Final Examination who has not completed the curriculum prescribed by the Society, in evidence of which a Schedule, to be obtained of the Secretary, must be produced, signed by the Dean of the Medical School or other authority.

No Candidate can, under any circumstances, be admitted to any part of the Final Examination without having passed in the whole of the subjects of the Primary Examination.

There is no exemption from any part of the Final Examination.

A Candidate qualified to practise out of the United Kingdom must present his Diploma, and the Schedules of the Society of Apothecaries must be signed by the Dean or other authority of the Candidate's Medical School, showing the course of Medical Study pursued. These Schedules can be obtained on application to the Secretary. The Diploma must have been obtained after passing a curriculum equivalent to that required for the Diploma of the Society, and from one of the Medical Bodies recognized by the Society. Evidence of having so passed, and of the identity of the holder of the Diploma, must be furnished to the satisfaction of the Society, and the Candidate will have to pass Sections 1 and 2 of the Final Examination.

A Candidate who is absent or withdraws from an Examination, having once entered his name, will not be permitted to present himself until after the expiration of three months,

when the re-examination fee will be required, unless such absence is due to illness, in which case a medical certificate must be forwarded immediately.

In the event of failure, a Candidate will be referred for three or for six months, as may be directed.

The Examination Offices at the Hall of the Society, Water Lane, Blackfriars, London, E.C., are open from 10 to 4. Saturdays, 10 to 1.

FEES.

Primary Examination.

	£	s.	d.
Primary Examination - - -	5	5	0
Re-examination after rejection in Part I. or any subdivision thereof - - -	3	3	0
Re-examination after rejection in Part II. -	3	3	0

Final Examination.

SECTION 1.

Final Examination, Section 1 -	*10	10	0
Re-examination after rejection in A, Part I., Surgery - - -	3	3	0
†Re-examination after rejection in B, Part II., Medicine, including (a) and (b) -	3	3	0
Re-examination after rejection in C, Part III., Midwifery - - -	3	3	0

SECTION 2.

Final Examination, Section 2 -	5	5	0
Re-examination after rejection in A, Part I., Surgery - - -	3	3	0
Re-examination after rejection in B, Part II., Medicine - - -	3	3	0

* The fee for Section 1 of the Final Examination is 15 guineas, unless 5 guineas has previously been paid for the Primary Examination, in which case the fee is 10 guineas.

The fee for the three Examinations is 20 guineas. Persons holding a Diploma recognized by the Society are required to pay the entire fee of 20 guineas when entering for Examination.

† A Candidate may separate Medicine from Forensic Medicine (a, b), but in the event of his doing so, and failing to pass the Examination, an extra re-examination fee of 3*l.* 3*s.* is charged.



Some Useful London Addresses.

- British Dental Association, 19, *Hanover Square, W.*
British Medical Association, 429, *Strand, W.C.*
Central Midwives Board, *Caxton House, Westminster, S.W.*
Conjoint Board, 8-11, *Queen Square, Bloomsbury, W.C.*
Epsom College (London Office), 37, *Soho Square, W.*
General Medical Council, 299, *Oxford Street, W.* (after
November, 44, 46 and 48, *Hallam Street, Great Portland
Street, W.*).
Harveian Society, *Stafford Rooms, 33A, Tichborne Street, Edgware
Road, W.*
Hunterian Society, *Hall of Barbers' Company, Monkwell Street,
E.C.*
Imperial Cancer Research Fund, 8-11, *Queen Square, Blooms-
bury, W.C.*
Lancet, The, 423, *Strand, W.C.*
London and Counties Medical Protection Society, Ltd., 32,
Craven Street, Strand, W.C.
Medical Defence Union, Ltd., 4, *Trafalgar Square, W.C.*
Medical Society of London, The, 11, *Chandos Street, Cavendish
Square, W.*
Metropolitan Asylums Board, *Victoria Embankment, E.C.*
Pharmaceutical Society of Great Britain, 17, *Bloomsbury
Square, W.C.*
Practitioner, The, *Howard Street, Strand, W.C.*
Research Defence Society, 21, *Ladbroke Square, W.*
Royal Army Medical College, *Grosvenor Road, S.W.*
Royal College of Physicians, 12, *Pall Mall East, S.W.*
Royal College of Surgeons, 39-43, *Lincoln's Inn Fields, W.C.*
Royal Institute of Public Health, 37, *Russell Square, W.C.*
Royal Medical Benevolent Fund, 11, *Chandos Street, Cavendish
Square, W.*
Royal Naval Medical School, *Greenwich, S.E.*
Royal Society of Medicine, 1, *Wimpole Street, W.*
Society of Apothecaries, *Apothecaries' Hall, Water Lane,
Blackfriars, E.C.*
Society of Medical Officers of Health, 1, *Upper Montague
Street, Russell Square, W.C.*
Society for the Relief of Widows and Orphans of Medical Men,
11, *Chandos Street, Cavendish Square, W.*
University of London, Senate of, *South Kensington, S.W.*

THE PRACTITIONER.

OCTOBER, 1915.

THE TREATMENT OF ACUTE GONORRHŒA.*

By CHARLES GIBBS, F.R.C.S.

Surgeon, Charing Cross Hospital; Surgeon, Lock Hospital, etc.

It will be understood that I cannot deal fully with the subject of the treatment of acute gonorrhœa in one lecture; but by taking it practically, a good deal of the ground can be covered. The diagnosis and history must be taken for granted.

When a man comes with obvious acute gonorrhœa, what is to be done? We first try to ascertain whether he has got anterior or posterior urethritis; that is the most important thing of all. Next, if the patient can afford it, we shall probably send him to a pathologist or bacteriologist to determine the nature of the germ, remembering the great fact, that if the disease has existed more than a week, the bacteriologist will probably not find the gonococcus. But his failure must not mislead us, for this germ is certainly present. If the patient has given himself only one injection of protargol, permanganate of zinc, or what not, the pathologist's report will be negative. This is a very encouraging verdict for the patient, and for the doctor, if he be in ignorance of the injection having been given.

The practical surgeon will then ask the patient when he had connection. He may reply that it was three or four days previously. On asking him when the discharge appeared, he will say "this morning." If the discharge is yellow creamy pus, it is a case of gonorrhœa. This is not a scientific diagnosis, but it is a very practical one. No notice need be taken of the other parts of the pathologist's report, as to the presence of other bacilli, such as staphylococcus, bacillus coli, the diplococcus of Dudgeon, and so on, for the treatment for all at this stage is the same. In early cases, the staphylococcus

* Clinical lecture delivered at Charing Cross Hospital.

is the commonest germ to be found, and in later ones, the bacillus coli is often added; the latter generally means infection of the patient by himself. He has probably been using an ordinary syringe, and leaving it about anywhere, dropping it on to the floor, putting it into his pocket, or wrapping it in soiled paper.

To ascertain whether the disease is in the anterior or in the posterior part of the urethra, the man must have held his water for four hours; if he has held it for only an hour or two no diagnosis can be made. If he has held it longer than four hours, so much the better. But if, on a warm day, an ardent young man has held his water much longer than four hours, it will be so thick that nothing can be made of it.

We look first at the penis, and note the amount of discharge. The patient will tell us about the pain. There may be some blood; if this is found on the shirt before passing water, it has come from the anterior urethra, and is generally the result of rough usage with the syringe. But the appearance of blood after making water means posterior urethritis. If the man looks at his penis after passing water, and sees a bead of blood or blood-tinged urine, it has come from the posterior urethra.

Posterior urethritis is a serious condition. It means an inflammation of the urethra between the bulbous urethra in front and the neck of the bladder behind. There may be inflammation of the prostatic urethra, and the neck of the bladder, called by the Americans "cervical cystitis"; sometimes called by us "posterior urethro-cystitis," a very good name. It may cause inflammation of the prostatic substance, with, perhaps, abscesses; chronically inflamed prostate is called by the French "nutty prostate," because it is nodular. The inflammation may spread into the vesiculæ seminales and cause vesiculitis, which used to be called spermato-cystitis; these glands secrete a substance like lard. It may travel along the vas deferens and cause epididymo-orchitis. The germs may involve Cowper's gland and produce cowperitis; or there may be vasitis, which can be felt in the inguinal canal.

Anterior urethritis is inflammation of the anterior seven

inches, which can be reached with an ordinary syringe. I am speaking of an ordinary moderate case, not the ultra-acute variety, and 90 per cent. of these cases of moderate inflammation of the canal have much discharge of pus, but little or no pain. At the Lock Hospital may be seen 20, 30, 50 patients with gonorrhœa, who will say they have no pain. The exceedingly severe cases which are read of in books are seen but seldom; I mean the kind to which the terms fish-hooks, molten lead, and boiling water are applied. Such cases must be put to bed for a few days, given a purge, hot sitz-baths, and plenty of demulcent fluids, have lead and opium applied round the penis, and told to wait. Nothing further is of any use, until three or four days have passed and the condition has moderated.

GENERAL TREATMENT.

With regard to the treatment, general and local, of a moderate case of acute gonorrhœa, it must be remembered that all the points in the treatment of this condition are important. Everybody knows something about the treatment of gonorrhœa. It is the agglomeration of all the facts into a useful whole, which cures the disease.

The first necessity for the patient is teetotalism, absolute and complete; not a drop of alcohol in any form must be taken, for it is the one little drink which spoils the whole matter. After treating a man for six weeks, he seems quite well; if he takes one alcoholic drink, the whole condition is back again. He must be warned especially not to drink "stone ginger beer," for it contains 2 per cent. of alcohol. I saw an Italian, this morning, who has been an absolute teetotaller, drinking a glass of vermouth before lunch and after dinner, and taking ammoniated tincture of quinine three times a day. This is worse than champagne. Obviously, ammonia is a strong irritant; it will irritate just as alcohol does. Patients must not be allowed to take ammoniated tincture of quinine for a cold during treatment for gonorrhœa. They must take no alcohol, coffee, mustard, pepper, or hot condiments; asparagus, celery, and rhubarb must be forbidden.

Asparagus is intensely irritating; it is nearly as bad as

beer. I have seen several cases of "asparagus clap," for infective germs are not the only causes of urethral pus; there may be a diabetic, a turpentine, or an asparagus inflammation of the canal. A young man eats a large quantity of asparagus for two or three days, two portions at lunch and two portions at dinner; the next day, he has a discharge of pus. It gets well when the asparagus is left off.

Finally, the patient must not eat much beef. He may drink water, tea, cocoa, milk, barley-water. Aerated waters are not good for him, because they generally contain a certain amount of soda, which will cause alkalinity of the urine; this is not good, because the staphylococcus loves an alkaline medium. That is why the old-fashioned prescription containing hyoscyamus and potash was of no use, for it helped the staphylococcus.

Next, the bowels must be made to act every day, by giving a little salts, but not cascara, podophyllum, or any bitter drugs. Epsom salts, Karlsbad salts, or Apenta should be used if necessary.

These patients must not ride a bicycle. Horse riding, after the first week or two, does not matter so much; some of your patients, especially at the present time, must ride. Bicycle-riding irritates the perineal urethra by pressure of the saddle, whereas the stress of horse-riding falls more upon the buttocks. Ordinary walking exercise can be taken, but not golf, cricket, tennis, or football, because of the acute friction of the scrotum and testes.

The next necessity is cleanliness. The foreskin must be pulled back, and the penis washed, using a weak disinfectant, such as Condyl's fluid, Listerine, or Sanitas. It must be kept as clean and as dry as possible. When the discharge is free, the patient must wear a gonorrhœa bag, to prevent it soiling his clothes. It must not be allowed to get into the eyes, or serious inflammation of them will follow.

The urethra should not be squeezed; many men, in their anxiety to see how the disease is getting on, squeeze the penis up and look at it every morning, not remembering that this squeezing damages the urethral single layer of epithelium considerably. A common occurrence is a lacunar abscess in

the penile portion of the urethra, and these are very difficult to get rid of; I have seen them last for months. One gets the urethra clear and the urine bright, and the man goes away, but in four or five days he comes back with a discharge caused by the leaking of pus from one of these abscesses into the urethra. They are often the result of the squeezing.

LOCAL TREATMENT OF ACUTE ANTERIOR URETHRITIS.

Next, we must speak of local treatment. For this an apparatus is needed, but it only costs 3s. 6d. It consists of an ordinary douche-can, three or four feet of indiarubber tubing, a clip, and a glass nozzle, which is fined down to a blunt point, and is flattened. The can holds a pint, and the quantity of contents can be seen by the marked scale. The can is suspended five or six feet above the patient, filled with water which is a little too hot for the hand to bear with comfort; the heat of the fluid is an important point. By the time the fluid has reached the nozzle and one is ready to begin, it will not be too hot.

The next point is the drug to be used as an irrigator. For the first five to seven days a silver compound is undoubtedly the best. The most efficacious, and the cheapest, for so little of it is used, is albargin, which is used in 0·1 per cent. solution; other very useful compounds are protargol, $\frac{1}{4}$ to 1 per cent., and argyrol, 2 to 8 per cent.

All drugs should be used of a definite arithmetical strength to ensure the reliability of results. To avoid mistakes in prescribing, the nought should be placed before the decimal point in ordering albargin. I have known a chemist assume that a mistake has been made in the prescription, because it was such a weak solution, and alter it to 1 per cent.

If the case being treated is pure gonococcal urethritis, a week of this treatment will cure it. But such cases are rare; the majority are generally mixed infections, into which the staphylococcus often enters. Usually a week of this treatment does not cure the patient, but makes the discharge better up to a certain point. If, after a week's treatment, the patient, on waking in the morning, still finds yellow-brown matter (caused by the silver staining), then permanganate must be used.

Permanganate of potash is good, but permanganate of zinc is better, one part in 4,000. Permanganate of potassium is used of the same strength, so too is Condyl's fluid, which is sodium permanganate. Zinc should be used for the injections, and potash for the irrigations, because the latter is more stable when made in bulk.

This is the ordinary routine treatment. Other drugs are useful, but are seldom used. If permanganates fail, the diagnosis and methods of treatment are at fault. Other drugs used are: sulphate of zinc, gr. 1 to the oz., sulphocarbonate of zinc grs. 2 to the oz. Some people use lead, and some bismuth; others use the three sulphates—copper, iron, and alum. Alum is useless, for its only effect is to dry up the discharge for a couple of days.

METHOD OF IRRIGATION.

The patient is placed on a couch, the foreskin is drawn back, and the penis is held between the 3rd and 4th fingers, and cleansed with 1 in 20 carbolic. In private practice, I use a nozzle made of aluminium, which I can sterilize with a spirit lamp at my side.

If the patient has had the disease for 24 hours, or a very short time, the penis should be gently compressed with the fingers from before backwards, until the tender region is passed. If the duration of the disease has been 24 hours, three or four inches of the urethra have become involved. The patient is then told to hold the penis, grasping the urethra firmly to prevent any fluid going back beyond the part involved. The fluid from the can is first allowed to play on the meatus; then the urethra is gently opened, and the nozzle is very gradually introduced for about half-an-inch, and it is washed out. If this causes much pain, it should be left for two or three days. If it is not too tender, the nozzle should be pushed further in, the urethra being alternately distended and evacuated. The urethra can be felt to be tense, and, if the condition is acute, the patient will say when it is distended. Albargin does not hurt, but permanganate hurts a good deal the first time the patient makes water afterwards. My practice is to use three pints of

fluid, as hot as can be borne. If the disease only extends two or three inches up the urethra, he should be told to come the following day. If the discharge is very much better, the same procedure is repeated every day. This is not specialist's work, and this apparatus does not require expert skill to work it. The patient should be treated in this way for a week, a fortnight, or three weeks, and if there are only two or three inches of disease, he will be cured.

If the man has had gonorrhœa longer, or if this daily irrigation does not seem to be successful, probably the whole of the anterior urethra has become involved. Under these circumstances he must be irrigated every day, if convenient, allowing the fluid to distend the whole of the anterior canal, or he must buy the apparatus and be taught how to use it. But, added to this treatment, he must use an ordinary small syringe, which must be a half-ounce syringe with an indiarubber nozzle. It is probable the chemist will tell him he can only supply a $\frac{1}{4}$ -oz. syringe, because the $\frac{1}{2}$ -oz. size was formerly supplied from Germany. But a $\frac{1}{2}$ -oz. syringe should be insisted on. An average sized penis holds about 5 drachms; but I have seen penises in which an ounce syringe was insufficient. A $\frac{1}{4}$ -oz. syringe is useless. A $\frac{1}{4}$ -oz. of disinfectant will only kill off a certain proportion of the bacteria; it is a kind of pruning, rendering the soil all the better for those which are left. The whole success of treating gonorrhœa is a question of detail.

With regard to the use of the syringe, the foreskin must be pulled right back, and the nozzle fitted well into the urethra. If the patient asks how far he may push it in, he should be told to push it as far as he can or as far as he likes. The first inch or so of the urethra is covered by stratified squamous epithelium, and he cannot do much harm there. But the daily use of a "patent" syringe, which reaches three or four inches down the canal, diminishes and destroys the columnar epithelium, and a stricture results. When using the syringe, the glans must be squeezed, and care taken to hold the urethra and the syringe in the same straight line; then slowly and gently the fluid is injected home. At first, the patient is unskilled, and most of the fluid goes down his

trousers. After having emptied the syringe, the glans is pinched hard, and the nozzle gently disengaged; the fluid is then allowed to remain in the urethra for two minutes, if it is permanganate. After two minutes, it is allowed to flow out, and another syringeful is then injected, remaining a similar time. This is carried out three times a day: at 8 a.m. at 4 o'clock in the afternoon and at 12 midnight, if possible, that is to say every 8 hours. Some patients think it suffices to leave the treatment until they get home from business, and then do it at 8, 9, and 10 o'clock. Some do it first at 8 in the morning, then at 6 or so when they get home, and just before going to bed.

Albargin and the other silver salts are not used in this way. Albargin is used three or four times a day, and the fluid has to be held for 15 minutes, which is a long time to hang on.

As to drugs, there are three: sandalwood oil, cubeb powder, and balsam of copaiba. The last of these is not used in private practice, and it produces a rash in one case in every three. Sandalwood oil is the best, for it seldom produces a rash, on the average about once in 10,000 cases. It produces some pain in the left back, and a little indigestion, but that is avoided by taking it half-an-hour after a meal. The dose is 15m. within an hour after a meal. It may be taken in capsules, or plain. The oil itself is best, but it is nasty. Ten drops can be taken on a piece of sugar.

Copaiba should not be given. Cubebs is very useful, but it is a horrible drug to take, and the dose is one drachm three times a day. It is sometimes mixed with treacle, or molasses, making a hard paste. This is called "Portsmouth cake," and can be bought in tins in Portsmouth. It contains cubebs and molasses, mixed with orange syrup and raspberry jam. The dose of the powder is a large one, and if taken in cachets eight of them have to be taken.

Other drugs are completely useless in the acute stage of this disease. This applies to the various substances: hexamine, hetralin, helmitol, benzoate of soda, etc.

COMPLICATIONS AND THEIR TREATMENT.

If there is a long foreskin, or phimosis, there can be

inflammation underneath it—suppurative balano-posthitis. This may spread to the theca, when I call it thecitis—lymphangitis to the root of the penis, with inflammation of the glands. There is very seldom suppuration in the glands. The treatment for these complaints is the ordinary surgical treatment: syringe under the foreskin, hot fomentations, etc.

Frenal abscesses are very common, and fortunately are generally of fair size, they may be bigger than a walnut. With the patient under gas, a free incision is made in the middle of the frænum, and the abscess is then packed. Penile abscesses want packing most thoroughly. If the packing is left in only 24 to 48 hours, the abscess closes up, and a fresh incision is necessary.

Now, with regard to the treatment of the ordinary little lacunar abscesses often multiple along the floor, which are the most difficult things in the world to cure. The treatment is carried out every time the man makes water. When he does so, he puts the forefinger beneath the penis and the thumb on top, and slides them along until he feels a tiny swelling as small as a small bead. He squeezes it firmly with the tip of the finger, and then passes his water. This generally gets rid of them, if they are acute. If they are chronic, it may be necessary to pass a urethroscope and prick them; but that is difficult. They are seldom just under the mucous membrane, but they are peri-urethral. If squeezing does not cure them, a steel bougie is passed along the urethra, and the abscess is then massaged on to the bougie. It is often possible to get the blunt end of the urethroscope on the abscess and squeeze it down on to the thumb externally. I have tried in many instances to pierce them with the point of a needle, but have not yet succeeded. I have known a man to have lacunar abscesses for 20 years.

The next complication I want to speak of is acute retention of urine. Very often a nervous man with painful acute gonorrhœa gets acute retention. The treatment for this condition is to put the man in a really hot bath, 110° F., keep him there until he feels faint, and tell him to try all the time to pass his water. He should be given an enema, and a small dose of morphia subcutaneously; if he is not in a

bath, hot water must be applied to his pubic region. If this fails, a catheter must be passed. Puncture above the pubes should never be done, whatever advice is given. During the past year, I have seen a man with ordinary gonorrhœa and acute retention; somebody punctured him supra-pubically, and he died of virulent cellulitis in the space of Retzius.

First, the urethra must be irrigated thoroughly with some silver salt, and then a moderate-sized soft catheter, No. 8, is attached to the tube, and flooded with the albargin solution. After lubricating the meatus, the catheter is gently pushed along, the solution flowing out all the time, until the constrictor urethræ is reached; on pushing it through this spasmodic obstruction urine will flow. After thorough evacuation of the bladder, it is filled up with the albargin solution, and again evacuated, then the urethra is washed out again. It may be necessary to pass the catheter every day for a week, because the bladder has been distended, even up to the umbilicus; there is acute atony of the bladder, which is temporarily paralysed by over-stretching of the muscle fibres. These conditions are cured by careful after-treatment of an ordinary surgical nature.

With regard to epididymitis, it may be said that it is not a complication of anterior urethritis. The treatment for epididymitis is simple. If the condition is very bad, the man must be put to bed, and kept on his back, with a cradle over his legs, a pillow under his knees, and have applied an ordinary linseed poultice, not a fomentation. If made properly, a linseed poultice is most comforting. The pain is felt along the inguinal canal and in the back, on account of the drag of the swollen testes on the nerves. A longitudinal poultice is ordered, and by means of the long ends of the linen a loop is formed with the poultice in the middle, upon this is placed the scrotum, which is drawn up high on to the abdomen and secured by safety pins to a bandage around the waist. The whole region is then covered up with a piece of cotton wool or flannel to keep the heat in, and left alone for five or six hours. Often a man goes to a nursing home, and has a fomentation placed on to his genitals; the scrotum is not drawn upwards, and consequently about four pounds are

added to the pathological weight of his testicles, causing much pain and misery. 10 per cent. guaiacol in glycerine is useful locally.

A second, and very important point, is to get the bowels open at once. Generally, nothing relieves the patient so much as that. A very good way of ensuring it is, three grs. of calomel at once, a double Seidlitz powder in an hour or two, and a cup of tea after that. Salicylate of soda, 15 grs. every four hours, gives relief.

The use of a vaccine is distinctly helpful in the treatment of acute gonorrhœa.



IRITIS.*

BY A. W. ORMOND, F.R.C.S.

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I HAVE used the term iritis rather than the term irido-cyclitis, because it is perhaps better understood and more generally used. The term irido-cyclitis is rather more comprehensive and probably more accurate, because the iris alone is very seldom involved. It must be remembered that the iris is continuous with the ciliary body, is automatically part of it, and is never alone the seat of pathological change. An iritis of any severity always implies that the ciliary body is affected and *vice versa*, and when the ciliary body is the seat of profound pathological change the iris is affected as well. However, we will keep to the term iritis, because it is more popular, and implies all we want to deal with for the present.

ANATOMY.

Anatomically, the iris is placed in the anterior part of the eye. It is the coloured part of the eye, and has in the centre the pupil, which varies in size according to the amount of light that is present at any particular moment; if the light increases, the function of the iris is to contract and limit the amount of light entering the eye. The pupil varies too with every effort at accommodation or at convergence; that is to say, it alters when the light changes, it alters when the eye is focussed for reading or for anything close to it, and it alters when the eyes converge and are drawn together.

HISTOLOGY.

Histologically, the iris consists of a meshwork of supporting blood vessels, involuntary muscle fibres, and pigment cells. The involuntary muscle fibres are arranged in two distinct

* Clinical lecture delivered at Guy's Hospital.

groups ; as a sphincter surrounding the pupil, which is the main means by which the pupil is contracted ; and as dilatatory fibres, which radiate from the centre to the periphery, and help to enlarge the pupil when the light diminishes. The blood vessels are numerous and arranged to radiate in the same way as the dilatator fibres, that is to say, more or less like spokes in a wheel. The blood vessels undergo movement with every action of the pupil. The pigment has a double distribution, large pigment cells being scattered in the supporting stroma, and the whole of the posterior surface being lined with a closely packed layer of pigment cells.

Physiologically considered, the functions of the iris are to regulate the amount of light reaching the retina, as well as, to some extent, to assist in the absorption of the aqueous. There is in the eye a continuous circulation of aqueous, which enters at the posterior part of the ciliary body, permeates the vitreous, surrounds the lens, passes through the pupil, and for the most part leaves the eye in the periphery of the anterior chamber close to where it entered. The iris, consequently, is surrounded by this fluid, and any pathological conditions will be affected by this relationship.

In albinos, there is no pigment, and light can pass through the iris itself ; thus, the function of controlling the light is more or less lost, and the result is a very blurred and indistinct vision. The pigmented layer, lining the posterior surface of the iris, is very dense, is loosely attached, and can easily be scraped off. The other group of pigment cells is in the stroma of the iris itself, and to a certain extent gives colour, which sometimes is blue, sometimes green, sometimes brown, and sometimes black ; if there is only a small amount of pigment, the iris is blue, and if a great deal, it is brown or almost black.

We have then a fluid circulation taking place in the anterior part of the eye, entering at the posterior part of the ciliary body, permeating and infiltrating the greater part of the transparent media within the eye, and for the greater part, leaving the globe through the filtration angle of the anterior chamber, but also through the anterior surface of the iris itself. In this fluid, the iris hangs as a curtain, and the only other structure touching it is the lens, the convexity

of which supports the pupillary margin when the pupil is contracted.

It is more or less proved that a certain amount of absorption takes place on the inner surface of the iris. If suddenly the light becomes less, the pupil will dilate. The iris is a vascular body containing a number of blood vessels, and therefore it would naturally take a certain amount of time for the blood in those blood vessels to be suddenly squeezed out. One cannot imagine a vessel full of water being suddenly emptied, unless the means of egress for the fluid is extremely free. We may turn a cup of water upside down and rapidly empty it, but we cannot empty a bottle with a small neck very quickly.

With regard to the absorptive power of the iris, there are on its anterior surface large crypts into which the aqueous can readily find its way; this facilitates rapid movement of the pupil, since with every alteration of the intensity of light and with every effort of accommodation and convergence the cubic capacity of the iris changes. These crypts allow the blood rapidly to enter the substance of the iris, and rapidly to leave it, thus enabling the pupil to contract and dilate. It increases the surface for absorption as well, and there is no doubt that the iris does absorb a certain amount of fluid.

SYMPTOMS.

We will now take the main question, the symptoms of iritis. The characteristic symptoms of inflammation in any structure are three or four in number: increased redness, swelling, a certain amount of pain, a certain amount of heat, and interference with function. These are also the signs of inflammation of the iris. In answering an examination-paper we should always get the general principle, and then work it out for the particular case. Taking first the question of swelling, which is the result of an inflamed area, how will swelling be brought about in the iris, and what will be its effect? Clearly, if there is a vascular structure—and the iris is intensely vascular—it will enlarge in size, in which case it becomes a little thicker antero-posteriorly, but this will not be so obvious; what will be obvious is that if it enlarges longitudinally, it

must of necessity contract the pupil. If this is clearly recognized, it helps us to remember another important symptom, the contracted pupil. In order to accommodate the increase of blood the iris must enlarge, and to do so it must trespass upon the area usually occupied by the pupil. Then, there is the increased redness. If there is iritis in one eye, and it is compared with the other, a marked difference will be noticed, and this is what would be expected if an increased amount of red is thrown into the colour of the iris. In the case of a dark iris, it is not so obvious.

As the result of the swelling and discolouration, the fine markings of the iris are lost. These very beautiful designs are due to the network of blood vessels, and in the case of inflammation they are all obliterated. The vessels supplying the iris come from outside the sclera, and perforate that tunic about six millimetres from the corneo-scleral margin. The main vessel divides into three, one branch being given off before perforation takes place and traversing the distance from the point of perforation to the corneo-scleral margin. This vessel, being outside the eye, remains visible, and gives us the indication of the condition of the vessels which perforate and which we cannot see. The perforating branch divides into two, one to supply the ciliary body, and the other the iris proper.

When inflammation occurs, the non-perforating branches dilate in conjunction with the perforating branches, and lead to the condition known as circum-corneal injection. This is characterized by being most intense at the corneo-scleral margin, and fading away towards the equator, in contradistinction to a conjunctival infection, which is more intense in the inner surface of the lids, and becomes less as it approaches the cornea. When the non-perforating branches are inflamed, a pink halo is formed all round the cornea, which increases in intensity the nearer it is to the cornea. In conjunctivitis, the reverse is the case; the redness decreases, the nearer it is to the cornea.

In iritis, there is no discharge from the eye. A patient comes with an inflamed eye, and one immediately thinks of conjunctivitis, which is the commonest and simplest ailment we have to deal with; but in the case of iritis, the patient

does not say that the lids "stick together in the morning," because, as a matter of fact, the discharge is not mucoid. Profuse lachrymation there may be, but this must be carefully differentiated from mucoid or muco-purulent conditions. It is due to a reflex irritation of the lachrymal gland and an increased secretion of tears, so that there is no discharge in the case of iritis, but a plentiful lachrymation. Photophobia is another symptom; the patient does not like looking at light.

All these conditions may be present with a mere congestion of the iris. The one sign which clinches the whole matter is the presence of an adhesion of the iris to the only structure with which it is in direct contact, namely, the anterior surface of the lens. As the increase in size of the vessel results in a diminution of the size of the pupil, the surface of the lens in contact with the iris is increased, and the fibrinous exudation glues the two structures together. If they are left in contact for a day or two, these adhesions require special efforts to break them down. On looking at the pupil, it will be noticed that it is not only small but immovable, except by strong measures. After the instillation of atropine it will be found that those parts of the iris, which are not adherent to the lens, will dilate, whereas those which are adherent will not.

The result of putting atropine into the eye is an irregular dilatation of the pupil; instead of the pupil being dilated, as it should be, regularly, there is no dilatation at certain points where the iris has been resting on the surface of the lens. The prolonged use of atropine will, however, in many cases stretch and break down these connections, and sometimes the only evidence that we can find of their having existed is the presence of some pigmented dots on the anterior surface of the lens; possibly, if the atropine were continued for several days or weeks, the pupil would become circular again. The pigment cells are very loosely attached, even in health, to the stroma at the back of the eye. In cases of quiet iritis, in which treatment by means of atropine has not been employed or has been employed too late, the adhesions may become permanent, and atropine will fail to affect them; this may necessitate surgical interference in order to open up the communication between the chambers on each side of the

iris.

These are the symptoms of iritis, but it must be remembered that the most characteristic symptom, which absolutely fixes the diagnosis, is the presence of these posterior adhesions, generally called "posterior synechiæ," because they connect the posterior surface of the iris with the anterior surface of the lens. Anterior synechiæ means an adhesion of the anterior surface of the iris to the posterior surface of the cornea. Anterior adhesions occur in tuberculous iritis, the tubercle sometimes mounting up until the posterior surface of the cornea is reached, and a connection is thus made between the two surfaces. The adhesions in iritis, however, are mainly posterior.

Any alteration in the tension of the eye is a sign that the ciliary body is involved. An increase of tension occurs, if the aqueous fluid becomes loaded with solid particles, dead cells, etc., on account of the obstruction the solid matter causes in the fine meshes of the pectinate ligament. These solid particles are carried to the periphery, and become enmeshed in the holes through which the aqueous passes; the tension will, consequently, rise, because the secretion is not able to flow out. A diminution of tension would be a sign that one function of the ciliary body, that of secreting aqueous, was being interfered with, and that the secretion was not taking place normally.

Another thing sometimes found in iritis is the presence of little masses of mononuclear leucocytes and pigment lying on the posterior surface of the cornea, the so-called keratitis punctata (K.P.) which is also a sign of cyclitis, the leucocytes being thrown off from the ciliary body and carried by the aqueous circulation to the cornea to which they adhere. On looking at the back of the cornea in some of these cases, tiny little dots will be seen, which are really masses of leucocytes; these solid particles will remain suspended and as the eye moves they will be thrown against the back of the cornea. Keratitis, or K.P., is an old name and a misnomer, but we maintain it because it conveys a definite clinical picture.

A typical case of tuberculous iritis shows the presence of "tubercles" in the iris tissue; they are generally on its anterior

surface, near the pupillary or peripheral margin, and rise towards the posterior surface of the cornea. If the "tubercle" is sufficiently high, it touches the posterior part of the cornea, and at the point of contact this turns opaque; an interstitial haze develops, due to the toxic irritation of the corneal tissue. These "tubercles" and opaque corneal areas are mainly found at the periphery of the cornea, but the opacities may develop anywhere, independently of contact with the "tubercle." At the same time a number of posterior synechiæ will be present, these being firm, moderately wide, blunt-ended adhesions, which show no disposition to yield to the action of atropine. These three clinical appearances, grey "tubercles" on the surface of the iris, discrete corneal opacities, and broad flat synechiæ, form the typical clinical picture.

Tubercle has other forms in which it attacks the iris. A large solitary mass at the angle of the anterior chamber may involve the sclera, and produce a bulge at the ciliary region, which may perforate, or the whole anterior chamber may be filled with tuberculous material. Another form, which is less certainly tuberculous, is the "mutton-fat" deposit in the anterior chamber. I have not been able very often to prove satisfactorily that tubercle was the ætiological factor in these cases, but they are held to be tuberculous by many competent observers.

It is unnecessary, I think, to complicate the description of tuberculous affections of the ocular tissues by describing numerous clinical varieties, since these groups when analysed only depend on the fact that the smallest and earliest lesion is the miliary "tubercle." If these are numerous and close together, a single large mass is formed instead of a number of small ones, and this large conglomerate mass may have some small single "tubercles" on its periphery. Tubercle does not produce an acute iritis in the same way that syphilis or gonorrhœa do; that is to say, an iritis which comes to an intense condition in two or three days, with the episcleral and conjunctival vessels all involved, much pain, photophobia, lachrymation, and rapid, serious failure of vision. Tuberculous irido-cyclitis is usually chronic, with slight redness of the eye, slight watering and photophobia, and slight pain.

Tuberculous iritis may heal spontaneously, but, on the

other hand, the interstitial opacities in the cornea often produce serious interference with vision. If the inflammation spreads backwards and involves the ciliary body, the whole eye may shrink, and phthisis bulbi result.

Tubercle may attack the ciliary body either before or at the same time as the iris. When the ciliary body is involved, the interference with sight is more marked, for the ciliary muscle is affected in the early stage, and vitreous opacities form later. The sclerotic in the ciliary region is often invaded in those cases in which the ciliary body is attacked, and a sclero-keratitis with localized ciliary congestion and ciliary staphyloma may result. This, however, is much rarer now that the disease is becoming recognized earlier, and tuberculin treatment undertaken systematically.

So much for the symptoms of iritis, which all vary enormously in intensity. One man may come with so much pain, so much distress, and so ill that he is really seriously affected. On the other hand, there are cases of iritis with which the patient merely strolls in and complains that he does not think his sight is as good as it used to be. Between those two experiences there are many varieties. The majority of patients seek our assistance on account of the redness of the eye, pain, watering, or interference with vision.

Clinically, we may differentiate acute, subacute, and "quiet" iritis. The acute cases generally experience severe neuralgic pain, marked photophobia and lachrymation, intense circumcorneal injection, diminution of vision, and general mental distress. On examination, we find the patient has a reluctance to open the eye, and on gently forcing the lids apart a profuse flow of tears takes place. We notice the circumcorneal redness and small pupil, and the patient complains of tenderness of the globe to all manipulation. In the sub-acute attacks, the eye merely aches, and the redness, photophobia, and lachrymation cause only a slight degree of discomfort, but the vision is good, the patient noticing only a slight mist when looking at objects with the eye. In the "quiet" cases, all symptoms may be absent for weeks and months, until the small pupil is invaded by some opaque exudation, and the vision begins to fail. One pathognomonic sign of iritis is the demonstration of the presence of the adhesions

I have already referred to. There are two varieties of pain experienced in iritis, a dull aching pain and a neuralgic shooting pain; the intensity varies, and in those cases designated "quiet" iritis may be altogether absent.

Interference with vision is another symptom which varies very much. In some cases, if the aqueous is just a little turbid, the vision will be interfered with to a slight extent; on the other hand, if there is a small pupil, and lymph is thrown out into that pupil, actually filling it up, it will be understood that the sight may be so seriously interfered with, that the patient is not able to see more than shadows at a distance of a few yards.

A syphilitic iritis is comparatively painless, the photophobia and lachrymation being slight and very easily treated, reacting most satisfactorily to the proper treatment; sometimes, the congestion is considerable and the adhesions large, but generally not more than one or two are present.

ÆTIOLOGY.

We will now deal with the ætiology of iritis. Syphilis, gonorrhœa, and tubercle are all well-approved causes, but beyond that the causation is not so absolutely certain. The iris and the ciliary body have the function of secreting into the eye a certain fluid, as well as that of absorbing to a certain extent some of that fluid. What is brought into the eye and what is taken out will affect the condition of the iris. If there are in the blood-stream various bacteriological toxins or chemical toxins, they will be conveyed to the interior of the eye by the blood-stream and irritate it. Therefore, iritis may be looked upon as never being a primary pathological entity, but as always secondary to some general infective condition. That is rather new teaching, because it used to be thought, until quite recently, that iritis was a special thing, as if it were a disease of itself which had no relationship to anything else. In secondary syphilis we get iritis very frequently, and the treatment is satisfactory. If a patient has an iritis that gives very little pain and very little disturbance of vision, but possibly causes a good deal of redness of the eye, and on examination one large synechia, or perhaps two at the most, is found, with a very thickened condition of the iris,

we may be quite sure that it is syphilis. If we use atropine, we shall find that in a very short time the adhesion will give way, and in a fortnight or three weeks the condition will have undergone a very marked improvement. We have always been successful in the treatment of syphilitic iritis.

The proof that gonorrhœa is a cause is, perhaps, a more recent discovery, but I do not think there is the slightest doubt in the matter at all. One frequently sees cases in which the anterior chamber seems to be full of a gelatinous material, and that is almost certainly a gonorrhœal case; it is quite characteristic. The anterior chamber seems as if it was solid. In nearly all such cases, a definite gonorrhœal infection will be found present at the time.

There is a great deal of evidence to show that any infective process in the body may produce iritis. The infective cases may be secondary to any pyogenic focus situated in any part of the body. Definite evidence has been obtained of iritis resulting from staphylococcal infection derived from the mouth (*pyorrhœa alveolaris*), tonsil, naso-pharynx and the accessory sinuses of the nose, ordinary boils, furuncular skin infections, etc. It is quite possible that certain toxins may be present and capable of producing iritis, but that is not well established. We really want to get rid of the term "idiopathic," which means that we do not know what the cause is.

That syphilis is a direct and primary cause of a large number of cases of iritis will not, I think, be disputed by any, and the evidence that gonorrhœa is a cause of iritis, and that the gonococcus will grow in the uveal tissue is also conclusive. The same certainty exists about tubercle. Syphilis, gonorrhœa, and tubercle, then, are undoubtedly causative factors of iritis and irido-cyclitis.

For years, rheumatism used to be given as a cause of iritis, but we now know that rheumatism never does cause it. Cases of rheumatic iritis are still quoted in the books, but they do not exist. Rheumatism was a term so loosely applied, that all forms of chronic septic absorption were called rheumatic. Chronic septic absorption is capable of producing iritis, but not rheumatism. As far as I know, only two observers have published cases of iritis directly associated with acute rheumatism; it is possible that others

have seen cases, but they have not published them. Still the coincidence of iritis with acute rheumatism is so rare, that it does not shake my belief that acute rheumatic fever must not be looked upon as an ætiological factor in iritis; I am the more confident of this in remembering that the advocates of rheumatism as a cause of iritis and irido-cyclitis have been challenged to produce their proofs for a sufficiently long time to enable them to do so, if indeed they possessed any.

When we consider the tens of thousands of cases of acute rheumatic fever treated all over the civilized world during the last ten years, the amount of evidence to prove an association between rheumatism and iritis is practically nil. With regard to chronic and sub-acute rheumatism, the proof that rheumatism in this form is not a causative factor in the production of iritis is more difficult, but I think it is nevertheless conclusive. The case may be stated thus: A patient having had an undoubted attack of acute or sub-acute rheumatism, is found sometime afterwards to have an arthritis of one or more joints, and later on iritis develops in one or both eyes. Is the ætiological factor producing the iritis really rheumatism? Rolleston, in his Hunterian lectures on "Acute Arthritis of Doubtful Origin," quotes cases in which a primary rheumatic synovitis became complicated by a secondary infection, such as tubercle, syphilis, etc., and also cases in which the joint trouble of patients suffering from acute arthritis was shown to be due to *bacillus coli*, syphilis, tubercle, typhoid bacillus, or acute periostitis, and concludes that acute arthritis may be a manifestation of various diseases.

I have notes of a case of a patient who was sent to Guy's Hospital with a history of rheumatic fever; during convalescence, a suppurative irido-cyclitis developed. On careful examination, it proved to be a case of acute periostitis of the humerus, with a metastatic deposit in the uveal tract leading to phthisis bulbi.

Acute rheumatism, then, is frequently simulated by various diseases which are not rheumatic in origin at all. The chronic arthritis, which sometimes follows attacks of acute rheumatism, has in some instances been proved to be due to a secondary infection. As Rolleston points out, a patient who has oral

sepsis may recover from the rheumatic attack and subsequently suffer from arthritis due to infection derived from the mouth. It is a fact too that irido-cyclitis, which is said to be of rheumatic origin, seldom shows any permanent reaction to the use of salicylates, such as we are accustomed to see in treating true rheumatism, or as we see when treating syphilitic cases with mercury; the slight improvement which is sometimes found may fairly be attributed to the diaphoretic action of the drug.

It is generally agreed that rheumatic fever never induces fibrous ankylosis; such a condition, when found in association with iritis, should cast a doubt as to the likelihood of the cause being rheumatism. Chronic rheumatism is a clinical entity described with unvarying regularity in the text-books, but with most unconvincing evidence of its ætiology. Take, for instance, Professor Osler's account. He says: "In my experience it is extremely rare as a sequence of acute rheumatism"; and again, "the salicylates are useless"; and again, "the majority of cases resist all treatment; it is a disease, however, which persists indefinitely." That Professor Osler is describing a definite clinical entity is certain, but that that entity has the *streptococcus rheumaticus* as its ætiological factor is by no means proved.

Our ideas are developing as to the cause of iritis, and we know that it is always secondary to some infective process.

With regard to gout, it is a very debateable question if gout can cause iritis. In the first place, we do not know what is the particular poison which produces the various manifestations of gout; secondly, the term "gout" has been used more loosely in the past than the term "rheumatism," and it has undoubtedly been made to cover a number of diseases which are due to chronic septic poisoning, especially that variety which appears to have a gastro-intestinal origin. Cases of iritis, which were called gouty, have now been placed in the group. Mr. Cobbledick published a case in which a man had gonorrhœa 30 years before, and yet he was able to grow gonococcus from the secretions in the prostate and in the iris. The idea is that the gonococcus can remain in the crypts possibly for a very indefinite time, so much so that people have been rather sceptical whether it is possible for a

gonorrhœal iritis to develop after such a long lapse of time ; but there is evidence that it is so. We do not know what is the poison that causes gout. It is quite possible that, whatever it is, bacteriological or chemical, the same poison might produce an iritis, but we cannot say.

TREATMENT.

I have only a little to say with regard to the question of treatment. Having cleared the ground to a certain extent by pointing out the ætiology of iritis, the treatment comes to be divided more or less into two parts, that is to say, local treatment and the treatment of the cause.

Syphilitic iritis must be treated as for the disease, and a gonorrhœal iritis in like manner. In pyorrhœa alveolaris, the pyorrhœa must be treated as well as the iritis. If none of the causes of the disease I have mentioned can be found, search must be made until a cause is found, or until the search proves fruitless. One must not rest content with treating a case as a case of iritis, it must be treated as well with regard to its cause.

There are so many pitfalls in the treatment of diseases of the eye, that some general practitioners have for years disclaimed all knowledge of ophthalmic work, and have been content to place these cases under the care of others who make the study of ophthalmic surgery a speciality.

With regard to iritis, however, once the diagnosis is correctly made, the treatment is continued on more or less stereotyped lines, in some cases with rapid success, whilst in others the impossibility of treating the primary cause precludes all probability of a satisfactory result, even in skilled hands.

In diagnosis, the difficulty lies in discriminating between cases of iritis and those of conjunctivitis and inflammatory glaucoma. In an inflamed eye, the condition of the pupil should be very carefully investigated ; if the pupillary area is perfectly black when viewed by ordinary daylight, and the pupil reacts evenly and at once to alterations in the intensity of light, the case is unlikely to be iritic.

With regard to glaucoma, it is not sufficiently recognized how rarely patients under 40 years of age are attacked by

glaucoma, and how infrequently acute iritis attacks patients over 40 for the first time. Iritis is mainly a disease of young male adults; glaucoma is mainly a disease of middle-aged women.

Atropine should be used in cases of iritis until the pupil is fully dilated, or until the drug ceases to produce any further dilatation. A solution of sulphate of atropine (gr. iv. in \mathfrak{z} i.) usually produces the maximum effect, if instilled liberally at intervals. The use of the pure sulphate of atropine, in the form of crystals placed inside the conjunctival sac, does not produce any better effect than that obtained by the gradual dilatation effected by the 4 gr. to the oz. solution applied over a longer period, and the latter has the advantage that it is less likely to produce toxic symptoms.

When using the solid crystals, the lachrymal duct must be kept closed by pressure. The use of atropine must be continued as long as the eye shows any inflammatory symptoms, and for absolute safety a few days longer. It is not, however, necessary to use a stronger solution than is just sufficient to keep the pupil dilated after full dilatation has been obtained. A solution of 2 gr. to the ounce is usually amply sufficient for this, if instilled twice or thrice daily.

If atropine irritation ensues, the drug should be discontinued, and homatropine and cocaine substituted. Duboisine sulphate and scopolamine hydrobromate, in 1 per cent. solutions, are other mydriatics which can be used instead of atropine.

The reason for using a mydriatic in iritis is, that by it the hyperæmia is diminished, and the adhesions or synechiæ between the iris and the anterior surface of the lens are broken down.

If the iritis can be traced to a definite and specific poison, the treatment will naturally be assisted materially by administering appropriate remedies for the cause; but there are cases in which a definite specific cause cannot be ascertained, so that the so-called idiopathic cases still remain. In these cases, mercury is always indicated, since it is an antiseptic, and iritis always suggests the presence of a poison within the system; mercury has too an undoubted influence on all inflammatory conditions, whatever their cause.

Diaphoresis combined with mercurial inunction is most

valuable in all syphilitic and idiopathic cases. The patient should be recommended to take three very hot baths each week just before bedtime, and to continue these for a period of three or four weeks; after the bath a drachm of the ung. hydrarg. oleatis should be rubbed into the skin, until the ointment disappears. The patient should be warned against rubbing the ointment into the same place more than once a fortnight. The armpits, bends of elbows and knees, the groins, and small of back are all suitable places for applying the drug.

In the early stages of acute iritis, especially of the gonorrhoeal variety, pain is often severe. A solution of dionine, 1 to 2 per cent., combined with cocaine and adrenalin, instilled into the conjunctival sac, is very useful for this symptom. Leeches, or small blisters, applied to the temple sometimes act like magic, and hot lotions are also beneficial.

Cases of iritis, especially those occurring in men accustomed to an active independent life, often produce a very irritable condition of mind, followed by great depression, the result of the pain, partial blindness, and resultant dependence on others. To combat this, the patient should be allowed carriage exercise, and be kept as far as possible in cheerful surroundings. The photophobia is sometimes very distressing, but in no case should all light be cut off from the sick room. Smoked glasses and a broad shade should be sufficient to protect the patient, and for the sake of the nurse and the patient's friends, as well as for his general health, the room should not be in total darkness.

All stimulants should, as far as possible, be avoided, as well as meat. The diet should be liberal, but easily digestible. Constipation must be prevented, and treatment should start with a brisk purge.

Tuberculous iritis is very chronic, and treatment must be carried out for a long time, in some cases even as long as two or three years. In intractable cases, subconjunctival injections of 1 c.c. of a 1 per cent. solution of guaiacol is useful. Tuberculin should be used in all cases, but in association with general and local treatment. In gonorrhoeal cases, the local treatment of the urethritis should be carried out; for the pain which is usually of a severe kind, dry heat is most satisfactory

This is best applied by means of "hot coil," which consists of a small electric resistance in the form of a flexible pad which can be bandaged on the eye so that it is possible to apply a constant dry heat for a period of half an hour or an hour two or three times a day. Leeches applied to the temple are unsurpassed as a remedy for the intense pain due to congestion, and blisters to the temple are sometimes useful. With regard to the syphilitic cases, as I have said before, the local treatment is generally very satisfactory; atropine acts rapidly, and usually prevents the formation of adhesions, whilst reducing those already formed. Treatment should be carried out vigorously, but I should not advise the use of 606, in the acute stages, for I have had one or two cases in which a severe neuro-retinitis has resulted from its use. I think it advisable to use this very valuable remedy after the acute condition is over, and to be content with mercury during the inflammatory stage.

In conclusion, I may say that iritis is commonest in young men and adults, and that undoubtedly 75 per cent. are due to venereal disease. Tubercle and infective diseases are causes which do not account for more than 25 per cent.



TREATMENT OF WOUNDS IN WAR.*

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[With Plate VII.]

I AM afraid that from the title of this lecture, the impression may, perhaps, be gathered that I propose to submit a complete scheme for the treatment of wounds in war, and to describe each class of wound in detail and discuss its appropriate method of treatment. This, however, would occupy too much time; and indeed, the mere attempt would be a presumption on my part. I wish, rather, to give a general impression of the conditions under which these wounds have to be treated, and of the attempts which have been made to solve the tremendous problems to which they give rise.

I think the methods at present adopted will be brought into better focus if I describe, shortly, the methods carried out in days gone by. If we owe our hospitals and the general treatment of wounded to Florence Nightingale and Henri Dunant, we owe the treatment of their wounds, in a very large degree, to Baron Larrey and Lord Lister.

The name of Lord Lister is known to all; it is to him that modern surgery is due. Without Lister's work we should still be struggling on in the same way as in the old days of sepsis, when a surgeon was only too delighted if he found the wound was pouring with pus. But Baron Larrey, perhaps, is not so well known. Baron Larrey was, in the opinion of many great surgical writers, one of the greatest surgeons who have ever lived, and I do not think that anyone will contest the statement that he was the greatest military surgeon who ever gave his services to the wounded soldier. He was surgeon-in-chief to the French Army in all the campaigns of the great Napoleon; but it was in 1812 and 1813, in the great Russian campaigns, that his work really

* Chadwick lecture at the Royal Society of Medicine.

reached its climax. He was responsible for the general organization of the whole medical services of the French Army; but his chief work, his personal services, were entirely devoted to the Imperial Guard. He organized for them flying ambulances, which enabled him to bring in the wounded in a time which was absolutely unprecedented. He followed the troops in all the vicissitudes of battle, and he began gathering his wounded as soon as the fighting began. His personal energy was immense, and it is only by actually reading his life that one can realize what a splendid man he was.

It is recorded that after the battle of Borodino he performed 200 amputations, with his own hands, in twenty-four hours. Of these, eleven were amputations at the shoulder joint, and nine of those cases made good recoveries. Such results, on the soldier in the battlefield, would make any surgeon proud even at the present day, with all the resources of modern surgery behind him. Larrey's skill as an operator was masterly, and he did all that he could to impart this skill to others. It is on record that during the passage of the great army through Berlin, he held a special class in operative surgery for the Prussian doctors. His life was one long story of indomitable energy, dauntless courage, and incomparable skill. One or two instances may be given.

At the crossing of the Beresina, one of the most terrible scenes in all the campaigns of Napoleon, when the last troops had crossed the bridge, which was swept from end to end by the fire of the Russians, Larrey suddenly discovered that he had left behind an important case of surgical instruments. He ran back across the bridge, got his case of instruments, and returned, the last Frenchman across the Beresina. On the snow beside the Beresina he set up his ambulance, and proceeded to deal with the wounded. Among them he found an aged Polish gentleman, General Zajaczek, with a badly lacerated arm. He amputated the arm at the shoulder, in the snow with the temperature far below zero, without anæsthesia, and without antiseptics. The General made an excellent recovery, and lived until the good age of 86. I think we can agree that Napoleon had good reason, when he said of Larrey, "*Il est l'homme le plus vertueux*

que j'ai connu."

Larrey laid down two great principles of treatment, which have a very definite application to our work at the present day. The first he called the "Twenty-four Hours' Principle," and by that he meant that if the condition of a limb was such that amputation at some time would be necessary, it was of great importance to remove that limb within the first 24 hours. Though he did not realize it, he was actually applying a great principle, that of asepsis, which Lord Lister discovered, and with which I shall deal in a moment. During the first 24 hours he was practically operating on what we call a clean limb. The second principle he called the "Principle of Humanity"; by which he meant that operations must be performed in the absolute minimum of time. In those days there were no anæsthetics, and the operation was performed on a conscious patient, so that it is not difficult to realize how much a brilliant technique meant to him. Larrey rarely took more than four minutes to perform an amputation at the shoulder joint or the hip joint, including every detail involved in that operation, tying blood vessels and suturing the skin, the actual removal of the limb occupying, as a rule, 15 seconds; this gives some idea of his expertness. He liked to have a man standing by with a watch, timing him. A colleague thought I was boasting the other day when I told him I had performed an amputation at the hip in 20 minutes.

In spite of our antiseptics and anæsthetics, those two principles still have an important application for us. We have resources by which we can avoid wholesale amputations, but we have no resources by which we can stop the progress of sepsis absolutely, though we can control it to a certain extent. It still remains true that upon what happens in the first 24 hours depends the future of the patient. In my opinion, it is during the first 24 hours that the highest surgical skill and the greatest surgical resource are required; even if it be only the skill which knows how to do nothing, and the resource that knows how to utilize delay. The second principle, the principle of humanity, has its application too. Larrey demanded brilliant technique to save the patient from pain; and it is no less true at the present day that a brilliant

technique will produce a more successful operation. It does matter how an operation is done, though the patient may not be able to criticize it at the moment. There is nothing in which manipulative skill has greater opportunity than in the surgery of the present day, and there is nothing in which manipulative and mechanical skill have a greater opportunity than in war surgery.

A description, in a life of Larrey, of an operation performed after a battle will give us an idea of what surgery was then. "During the retreat of the Grand Army, General Lejeune came upon a little scene which made a deep impression upon him. Tired out with the day's march, he sat down upon a tree stump when he saw, near by, a young man who was badly wounded. At his request, two medical officers who came by attended to the man, and found that immediate amputation of the arm was necessary. General Lejeune asked the young soldier whether he could endure it, and received the proud answer: 'I can endure whatever is expected of me.' The wounded man propped himself up behind the general, who did not wish to see anything of the operation. No cry of pain was heard, only the soft scraping of the saw. After a few seconds the surgeon said, 'Finished,' and regretted they had not a draught of wine to give strength to the pale patient. General Lejeune opened a small flask of wine which, with great difficulty, he had hitherto reserved, and with a thankful look the gunner emptied the flask. Then he said quietly, 'I have still a long way to go from here to Carcassonne,' and with firm steps he marched off." It was under these conditions that Larrey did his work. I think that even this brief sketch will entitle him in our minds to the respect with which Napoleon regarded him.

The second name mentioned was that of Lord Lister. What Lord Lister did for surgery was to enable us to operate in the absence of bacteria. That, I think, sums up the work which rendered modern surgery possible. Before Lord Lister's day, every wound was at once infected. When an incision was made through the skin, probably the knife was always septic, as well as all the instruments used. Nobody knew at that date of the existence of organisms, consequently, nobody attempted to get rid of them. It was Lister who discovered that the

organisms were the source of all the trouble that occurred in the wound ; that pus was not at all "laudable," as it had been termed ; and that wounds, in the absence of bacteria, would heal by first intention. But Lister did not succeed in teaching us to get rid of the bacteria in wounds already infected. That is a problem which is not yet solved, and, personally, I do not think it can be solved in any crude way, such as by merely putting disinfectants into the wound. But there is in Lister's work a direct application to septic wounds, which is seldom appreciated.

We are too apt, when we see a septic wound, to say that it is septic, and that it does not matter much what is done with it ; it can be dressed carelessly by anybody. It must be remembered, that if secondary infection of that wound can be prevented from occurring, almost as much has been done for the patient as if the bacteria in his wound had been destroyed. It is upon that conception that we may expect many advances in the treatment of these very difficult cases, particularly in the treatment of war wounds ; for, as I shall show presently, these war wounds are practically all septic. Nothing can prevent their being septic, and nothing but the patient himself can destroy the initial sepsis. But we can prevent the wounds getting more septic ; we can prevent them getting infected with every organism which happens to be around. The difficulty of doing this is very considerable. I have great respect for our hospitals, and for the way in which nursing is conducted there—I stand second to nobody in my respect for them—but I will say this : that if ten septic cases are put in a single ward, all infected with different organisms, by the end of a fortnight those organisms will be mixed up together so inextricably, that we cannot tell in which case any one of them began. It ought to be possible to prevent this. In any ordinary system of dressing, it always occurs ; it is only by very special arrangements that it can be prevented.

Having shown the conditions under which wounds were treated long ago by an extremely brilliant man, and spoken of the turning-point which converted ancient surgery into modern, I will now say something of the wounded at the present day, and of what we try to do for them.

When a man is brought in wounded, the first thing to deal

with, as a rule, is not his wound, but the man himself. One is not long out at the Front before realizing that. Men are brought in on stretchers, and the first thing to be done is to restore the patient to a condition when he is, so to speak, treatable. His clothes are probably sodden and caked with mud; he may have been working in the trenches for months, and his opportunities for cleaning his clothes or having a bath have not been extensive. He has been working out there under conditions which prevented his getting proper rest, and he has been exposed all the time to danger and to the weather. The result is a condition of strain, when even a slight wound may result in what we may call a nervous breakdown. In addition, if he is seriously wounded, he is suffering from loss of blood and from shock. Thus there are, first of all, the general conditions resulting from work, and secondly, the conditions which have been induced by his being wounded. All of these have to be treated first.

The first thing is to stop his pain. In the presence of severe pain, to do anything else is almost useless, and the way to stop his pain is to give him morphia. As soon as these seriously wounded patients were brought in to us at Furnes—and we dealt with none but the seriously wounded—there were three things which we did for every patient; we gave them morphia, we got them warm, and we filled them up with fluid. As a rule—in the very serious cases at any rate—we injected simple saline fluid under the skin, in the arm-pits or into the thighs. Salt water is absorbed into the blood vessels, replacing the fluid lost in the form of blood, and it restores the general tone of the patient. I assure you that in half-an-hour the most desperately wounded man, who apparently was moribund when he was brought in, and who in some cases would have been dead in another half-hour, was propped up and smoking a cigarette, which we always allowed them to do. One was not dealing with the ordinary hospital patient, some poor individual who has been living in a slum for the whole of his life; we were dealing there with men in the pink of condition, who had been living an outdoor life for months, and, however that life might have affected their nervous system, it had certainly improved their physical state. To restore such men no great skill or elaborate

surgery is required ; all that is wanted is morphia, hot bottles, and some sort of apparatus for injecting saline ; things which should be in every dressing-station. It was my misfortune, several times, to go into dressing-stations where they had none of the three, and, though one can carry morphia, it is difficult to carry the other two.

As to their wounds, I have said they were all septic, and by that I mean that all the wounds were infected by bacteria. Much has been said about the clean wounds which result from the modern rifle bullet. All I can say is, I have not seen them. I met, the other day, a surgeon who said he had seen, during the present war, 10,000 wounds, and every one of them was septic. Personally, I do not believe in the existence of a clean wound ; it may occur, as a surgical rarity.

What are these wounds infected with ? They are infected with simple organisms, non-pathogenic organisms, those which do not produce disease, but grow in the soil. Many of them have the curious character that they will not grow in the presence of fresh air. The wounds were not, primarily, infected with pus-forming organisms, and that is a very striking thing. Ordinary sepsis, as met with in hospital, or in ordinary life in England, depends on these pus-forming organisms, not on the others. Everything around us is swarming with these other organisms, but not to any great extent with the pus-forming organisms. Now can be seen the enormous importance of the work of Lord Lister, if we will only make use of it ; we can prevent secondary infection. The fact, that the wound is septic to begin with, makes no difference whatever to the care that should be taken in dressing it. The first dressing cannot be satisfactorily applied by the soldier himself, nor by anybody but an expert dresser. One does not need very high-class surgery to dress a wound cleanly ; but anybody with surgical experience knows what a lot of training is required to get people to do it. It only means having clean hands and not interfering with the wound. Above everything else, it means refraining from poking fingers or anything else into the wound. To do that is, to my mind, an absolute mistake. My own idea of the treatment of these cases is to disinfect the skin around, with

anything preferred, iodine, carbolic, or plain soap-and-water, and then to put on some sort of dressing, simple gauze, wool, anything which contains no organisms, and will prevent organisms from getting into the wound.

With regard to probes, I may mention what happened the other day. I had under my care a man with a wound in the thigh. It was not a very serious wound; it was fairly deep, but it was healing up all right. I sent him away to a convalescent home, and there some curious person pushed a probe into the wound, and pushed it straight through into the hip-joint. He came back to me with a septic arthritis of the hip, and I think he is very fortunate indeed to be able now, two months afterwards, to walk about the ward with a huge plaster appliance, instead of moving about, as he should be, with a movable hip. What the person hoped to gain or to learn by using a probe is beyond my comprehension.

Sepsis, then, is one of the characters of all these wounds; but the avoidance of secondary sepsis is, to my mind, the first essential in their treatment.

The second great character of these wounds—I shall only mention these two—is the great amount of destruction. There may be a small puncture, and apparently not very much damage. For some reason the wound is opened up, and we find inside, a cavity as big as a fist, and everything in that area destroyed. The enormous amount of destruction produced by modern weapons is unbelievable, until you have seen it. Time after time, in wounds of the thigh, there was a little entrance wound, and only a comparatively small exit, neither of them bigger than a shilling, sometimes very much smaller; but inside, there would be a cavity perhaps as large as both my fists together, six inches of the femur absolutely missing, and everything around smashed up. This tissue destruction is of very great importance, because these wounds are infected. There is a mass of dead material in the centre of the wound, and in that mass, organisms are going to grow.

Occasionally one will find bullets, bits of shrapnel, and so on, buried at the bottom of the wound. My opinion is, that unless there is a reason for touching them, it is better to leave them there. It is a very difficult question, because the bullet may have carried with it bits of clothing and

other dirty material, which will make a difference to the healing of the wound. In a large number of cases, however, the bullet causes no trouble at all, and I am decidedly against efforts to remove a bullet simply for the sake of removing it. It is popular with patients who want their bullets so that they can hang them round their necks. I know several whose wounds healed up entirely, who had their bullets removed for that reason.

The modern bullet is a peculiar object, and well adapted for producing great destruction. It is formed of a thin case of nickel, filled with lead. If the bullet were pure lead, the grooves of the rifle would be plugged up almost at once. The ingenious German has devised a bullet with its centre of gravity so far back that, on striking the skin, it tends to turn over; and in a certain number of cases it does turn quite over, and the blunt end first enters the tissues, the result being that it "mushrooms," as it is called. The German soldier has, in many cases, improved even on that, because he takes the bullet out of the cartridge and puts it in backwards, thus making sure that it will strike base first.

I will now speak of one or two specific kinds of wounds. I will speak first of wounds of the chest, because they do so extraordinarily well if nothing is done with them. If one must have a bullet, there is no better place in which to receive it than in the centre of the chest. Once there, the great thing is to leave it alone. Whatever may be the difference of opinion about bullets elsewhere, there is no question about that. Personal friends of mine are going about, in the very best of health, with bullets straight in the middle of the chest. The best thing in these cases is to do nothing, not even move the patient about, or stimulate him in any way; but simply to keep him quiet. If that is done for 24 hours, he will be practically out of danger. Various complications may arise, but, as a rule, complications are the result of being in too much of a hurry to get the man back to the base, and so on.

A friend of mine, to my very great astonishment, suddenly appeared in one of our wards at the London having been struck by six bullets at once. He had been out six months, but, till then, had not got a scratch. He was re-arranging some sandbags in front of the trench which,

apparently, were not thick enough to stop the bullets from machine guns, when he got six bullets. Three went through his clothes, two through his right arm, and one entered his right chest. In the position he was in, it was impossible to get him back, so they propped him up behind the sandbags where they were thicker, and he remained in that position smoking a cigarette for eight hours. When darkness came on, they got him back to the dressing station, and finally home to England. I think it says much for our transport service, that he reached us inside 48 hours from the moment of being wounded, although he had already spent eight of those hours in the trenches. He is now perfectly well.

Next, I would like to refer to another class, the abdominal cases. Here, the picture is very different indeed. I think I may say that the results are very bad, and there is considerable difference of opinion about what should be done. Again, there is a minute puncture, perhaps one in front, and one behind, and it does not look as if much had happened at all ; I have had to hunt for the bullet-wound before I could find it. Inside the abdomen, however, the destruction is terrific. In South Africa, where a different type of bullet was used, it was found that, as a rule, abdominal wounds only produced punctures, not great destruction of bowel. The German bullet is different, and we are now fighting at very close range ; a large number of wounded have been shot at 100 yards range, and some of the cases I saw were shot at only 10 metres. In such a case, the bullet on impact is travelling at a very high velocity indeed, and it is easy to see what destruction it can produce. What, then, is to be done with these cases ?

There are two courses open, for there are two schools. One recommends immediate operation in all these cases ; the other advises no operation at all. What is to be said for the two attitudes ? Those who say that no operation should be performed, because the damage is too slight, never can have looked inside an abdomen to see what damage is produced. I have scarcely opened a single abdomen—and I operated upon a good many—without finding a condition which was incompatible with life. Others say that operating in the field is impossible, both for military reasons, and because of the surgical difficulties involved. They hold what is, to my mind, an absolutely tenable position. Consider what it means to

operate on the abdomen. There must be an absolutely first-class hospital and a first-class nursing staff at our disposal, for at least $1\frac{1}{2}$ hours, whilst for each case three highly-skilled medical men are needed: an expert abdominal surgeon—I do not mean one who is accustomed to removing appendices, but a man who can really tackle big abdominal work; a first-class anæsthetist, and the surgeon's assistant. In the end, perhaps one out of three, perhaps one out of five, may recover.

It is a terrible question to ask, but war is a terrible thing; it is a question which I do not feel I can in any way answer. If one has the skilled services and the first-class hospital I mentioned, immediate operation is certainly the treatment. Unless those conditions are satisfied—and it is not for me to say whether they can be satisfied or not—operation is a mistake. I was so fortunate, at Furnes, as to have, to some extent, these conditions, but the labour involved in connection with such operations was tremendous; I cannot really say whether the results justified the labour. It is a terrible thing to have to place a man's life in the balance, when we think we could save it by a great effort. But when there are 50 or 60 other wounded men lying around, and the labour being expended on one may mean lack of attention to the others, it becomes a very difficult question. If one does not operate, there is only one other course open, and that is to give the patient a large dose of morphia and keep him quiet; he may recover. I want to put this question of abdominal wounds absolutely fairly. I am strongly in favour of having at the Front hospitals comparable with our hospitals in England, with surgeons who will do this work; because I do not believe that any of my colleagues, if he had in a London hospital a man who had been shot through the abdomen, would leave that abdomen unopened.

There is another class of case which interests me very greatly, and which is, perhaps, easier to discuss: serious compound fractures. The open wound in these is, in the natural course of events, septic. In these fractures the entrance and exit wounds are quite small. It looks nothing at all, but when one comes to move the limb about, it looks like nothing on earth or, I hope, in heaven. Several inches of bone are missing. A friend of mine said to me, "These fractures are easy to set, because there is no displacement."

I do not know what he means by displacement; you can put the limb into any position you like, for there is no resistance, and to deal with these things by ordinary splinting is beyond my ingenuity. Yet in order to deal with them, we must in some way fix the fragments together, and prevent the limb from falling about, because these cases have to be dressed two or three times a day, if the patient's life is to be saved, much less his limb.

In many cases, the attempt has been given up in despair and the limb amputated, but I think that is a poor way out of the difficulty. I think the best way is to regard these cases not as fractures, but primarily as cases of bone infection, and see what can be done to cure that infection. We can get rid of the fracture by fixing the two fragments together with steel plates. I shall be told, as I have been told before, that to plate a septic fracture is criminal; that at the end of a week the plate will become loose, and the condition will be worse than before. The first surgeon I mentioned it to said, "Yes, but did your wounds heal up?" He has dealt with some compound fractures since then, and he knows that the healing of a wound in a compound fracture does not depend entirely on whether or not there is a plate there. Anyone who knows how to mend a broken chair-leg, can screw the fragments of bone together and get rid of this complication, and he will then be able to deal with the infection. If it is done under suitable conditions, the plates do not become loose, but remain firm for weeks, until sufficient bone has grown up to enable the plate to be dispensed with, and then it can be taken out.

I should like to show a few interesting illustrations. Fig. 1 shows a case in which the shoulder had been completely shot away, and it was impossible to save his arm, so I amputated it in a peculiar way. Forming a huge flap from the upper arm I brought this over the shoulder, and sutured it in place, and though he lost his arm, he got away with a sound shoulder—and with his life. In another case, which was not so bad, I covered the raw area with a flap from his back.

Fig. 2 is the skiagram of a fractured femur of a German, who had been brought to us after lying in the trenches five days without receiving any attention. I have never seen

anything like his leg. It was twice the normal size, and mottled all over, and when one pressed it, gas came from the bullet-holes, and the smell was appalling. I opened up freely, and fixed the fragments with a plate. The illustration shows the fracture at the end of six weeks; the plate held quite soundly, in sepsis as great as could be met with. He went away with a sound leg.

Fig. 3 shows a fracture of the humerus in a young Scotsman. There were only small entrance and exit wounds, but the bone was pulverized. The fixing of that arm in any splint was a very difficult matter, but we tried one, because in the case of the humerus a splint is often as good as a plate. Fig. 4 is a photograph taken two months afterwards. It will be seen where bone has been thrown out all round. He had perfect union.

To sum up, I think the one thing I would like to emphasize first is the enormous importance of preventing any secondary infection getting into the wounds. Over in England, it will be possible for those who are dealing with the wounded to prevent further infection of the wound. On the other side, it is more difficult, but there are many things which may be done. To my mind, the complete solution of the problem will only come when we have, as close behind the firing line as possible, first-class hospitals, with first-class nurses and surgeons. These need be only five or six miles back, out of the reach of ordinary shell fire. Some cases may leave the Front all right, but they reach here septic, and that is what we want to prevent.

In the second place, we want the abdominal cases dealt with. I do not say it is possible, but it is a thing which I think we should attempt. Nothing could be finer than our present transport system; the wounded frequently reach our hospitals within 24 hours from the time they leave the trenches, a feat which cannot possibly be eclipsed. I am sure these abdominal cases *can* be dealt with, and I am persuaded that surgeons are not going to be beaten by them. The difficulties may be supreme, but surely they are not beyond the resources of British surgery.

PLATE VII.



Fig. 1.—Whole of shoulder region
carried away by shell



Fig. 2. —Femur six weeks after
plating. Plate still firm.
Union. Note callus. (X-ray by
Madame Curie.)



Fig. 3.—Bullet wound
of humerus.

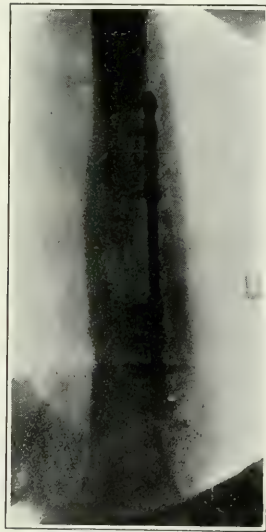
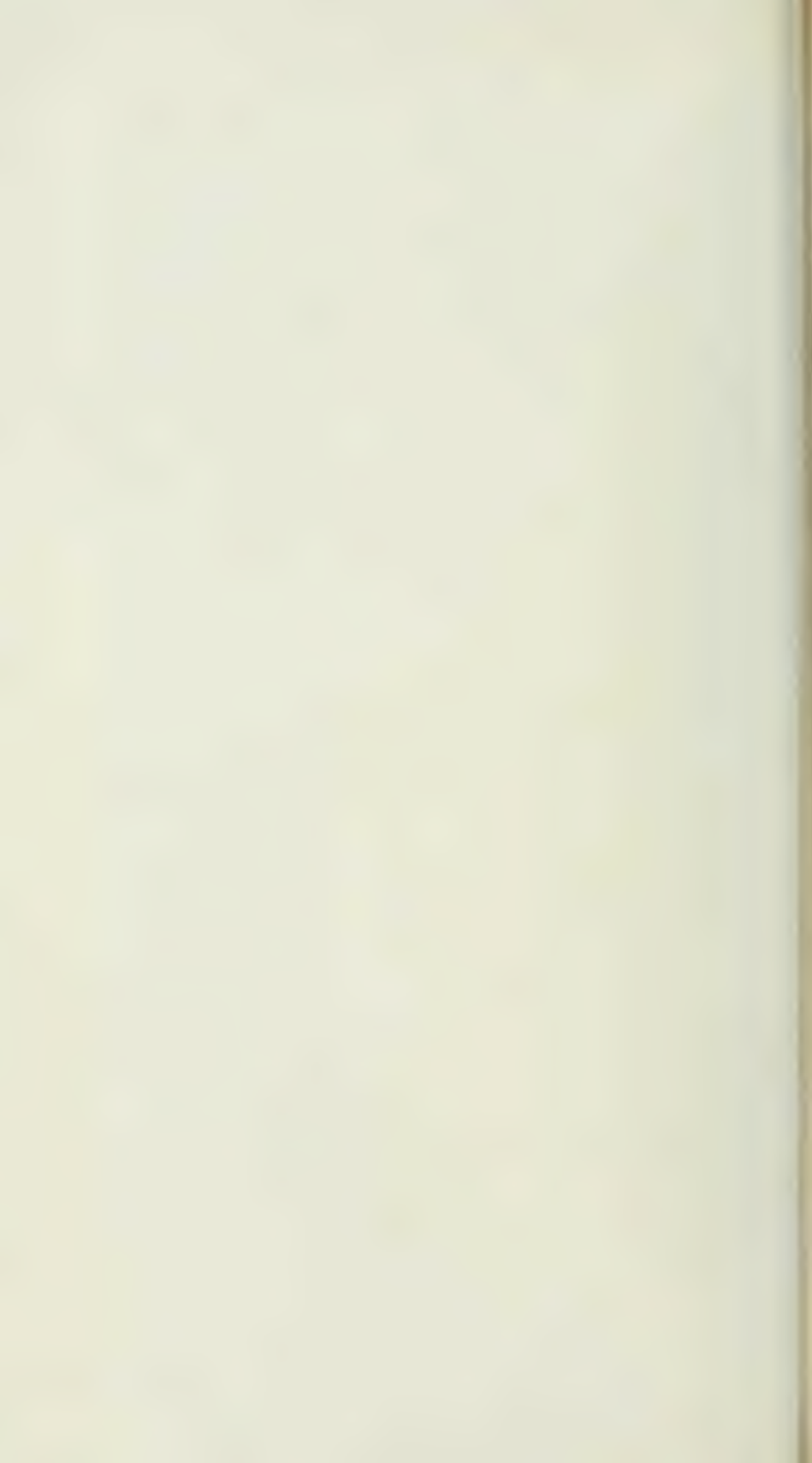


Fig. 4.—Eight weeks after
plating. Plate still firm.
Union.



ACUTE MASTOIDITIS.*

By W. M. MOLLISON, M.C., F.R.C.S.

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ACUTE mastoiditis is one of the commonest complications of acute suppurative otitis media; it may occur, too, in the course of a chronic suppurative otitis media, but then it is often in conjunction with other and serious intracranial complications. Theoretically, if otitis media is correctly treated from the beginning, chronic suppuration ought not to occur. The disease, then, will be considered as it occurs in the course of an acute suppurative otitis media.

The phrase "acute mastoiditis" indicates acute infection of the bone forming the mastoid process. We want to see how this infection takes place.

In order to appreciate this properly, one should examine the anatomy of the middle ear, and its relationship to the mastoid process and to the cells of that process.

In the first place, it should be remembered that the middle ear cleft is developed from the space between the two portions of the temporal bone, the petro-mastoid and the squamo-zygomatic. The anterior end of the middle ear cleft forms the Eustachian tube; the middle part of the cleft forms the tympanum and the attic; and the posterior part forms the antrum. *This picture shows the spaces very well; it is a picture of a developing temporal bone. (Demonstration.)* The way in which the squamo-zygomatic portion forms the outer wall of the antrum is by sending down a process of bone on the outer side of the mastoid process; you can see it here coming down and closing the antrum on the outside.

In the adult bone, the continuity of the different portions of the middle ear hold as in the embryo. In this specimen, the temporal bone has been cut across in such a way as to show the Eustachian tube, the tympanum, the antrum, and the

* Clinical lecture delivered at Guy's Hospital.

aditus from the tympanum to the antrum. We can thus see that the middle air cleft, including the Eustachian tube, tympanum, attic and antrum, is really all one space, and it is lined with mucous membrane throughout. Therefore, infection can pass from the Eustachian tube *viâ* the tympanum to the antrum, through the mucous membrane which lines the whole cleft. The antrum, as you see in this specimen, lies deeply in the mastoid process in its upper anterior part. Its surface marking is MacEwen's triangle, this little depression immediately behind and above the bony external auditory meatus.

We must now consider the structure of the mastoid process. This varies very much in different bones, but two main types of mastoid process are demonstrable: one the *cellular* type, and the other the solid or so-called *diplöetic* type. Here are specimens to illustrate that, because it is most important to grasp the fact that there are those two types, since structure has a considerable influence on the course of disease. Here is a bone cut across to show the whole mastoid process hollowed out into a series of bony cells extending to the tip, to the highest part where the mastoid process forms, practically speaking, the floor of the middle fossa of the skull, and backwards to the groove for the lateral sinus. This is another even better specimen of the same type, showing more clearly the relation of the mastoid process to the antrum; notice that one or two of the cells at the tip of the mastoid process are larger than the majority.

Here is a specimen of the other type for comparison. The bone is completely different in structure from that in the previous specimens; it is quite dense. At the tip of the mastoid are one or two small cells, but on the whole all the process is solid without cells. Occasionally one sees a mixture of the cellular and the diplöetic bones, with a few cells in the part just surrounding the antrum, but none elsewhere.

It is quite obvious that if there be a solid bone, as in the diplöetic type, suppuration in the antrum will meet with difficulty in spreading through the bone; when, however, the bone is hollowed out into a series of cells communicating directly with the antrum, suppuration will readily spread in all directions.

Let us consider a case of acute suppurative otitis media,

and see how it gives rise to acute mastoiditis. Infection spreads from the nasopharynx through the Eustachian tube to the tympanum; the mucous membrane of the tympanum is continuous through the aditus with the mucous membrane of the antrum, and infection is thus easily carried to the antrum, and in a cellular bone to the lining of the mastoid cells. Those of you who have seen cases of acute otitis media will remember that in a large number there is slight tenderness over the mastoid process; this does not indicate that the mastoid process is involved in suppuration, but that the antral lining is inflamed, and pressure on the surface of the bone elicits tenderness on that account. When the case is one of suppurative otitis media, infection spreads as before but pus is formed in the tympanum; the pressure of this pus causes bulging outwards and, later, rupture of the tympanic membrane. In these cases, there is acute inflammation and, perhaps, even suppuration in the antrum. It is far better, in cases of acute otitis media where suppuration has occurred, that the membrane should be incised by the surgeon than that it should be allowed to rupture. In many cases, this freeing of the pressure in the middle ear will prevent the suppuration from spreading into the antrum; even if this result be attained, a purulent discharge will persist, though getting less, for 10 days to 3 weeks; it will then cease, and the membrane will heal. That is the normal course, so to speak, of suppurative otitis media.

In a certain number of cases, suppuration takes place in the antrum in spite of free drainage of the tympanum through the incision in the membrane. Owing to the position of the antrum, drainage of pus from it through the tympanum is not easy. Look at this bone, and notice the small triangular opening from the upper and posterior wall of the tympanum into the antrum. That is the aditus, and you see the antrum is a space so shaped that its floor is at a lower level than the aditus, through which it opens into the middle ear. Therefore, if suppuration takes place in this cavity, drainage is not perfect.

Suppuration in the antrum can easily pass to the cells which you have seen in the cellular mastoid, and thus cause suppuration throughout that process. Such a condition is really an osteomyelitis of the mastoid process. The spread of the inflammation can occur in a dense bone, but not with such

ease, and the symptoms produced are somewhat different in the two types of bone.

How are we going to decide when suppuration has taken place in the mastoid cells? You are all familiar with the typical case of acute mastoiditis of the text-book. The auricle on the affected side is pushed downwards and forwards by a swelling over the upper part of the mastoid process; this swelling is very tender, often fluctuating, and the skin over it red and shiny; there is a profuse discharge of pus from the meatus, and there is often some little rise of temperature. The patient is generally a child, and little more than a glance is required to decide the diagnosis. Unfortunately, this typical case is seldom seen outside hospital practice, and we must now consider those cases in which the signs of pus in the mastoid process are slight, and early diagnosis is often a matter of some difficulty.

Consider a case of suppurative otitis media, in which the membrane has been incised. Let us enumerate the signs which would lead to a diagnosis of pus in the mastoid process.

The first sign is persistence of the flow of pus from the tympanum. This occurs because the antrum and the mastoid cells form a reservoir of pus, which must drain out forwards through the hole in the membrane, and so through the meatus. Hence, there will be a constant discharge of pus in greater quantity than can be accounted for by the involvement of the tympanum alone. That is one important point. In some cases, after wiping away the pus from the meatus and so exposing the perforation in the membrane, pus can be seen coming through the perforation again at once. Occasionally, the discharge stops; why is that? The aditus, as you see, is a small triangular opening, which is lined with mucous membrane, and has articulating into its inferior angle the incus, which still further reduces its size. The mucous membrane may become so inflamed and swollen that the pus in the antrum and cells cannot come through the aditus, and so out through the membrane.

The second sign is deafness, and that is rather an important point. You will see the reason for considering deafness presently, when we consider differential diagnosis. It is obvious, when

you consider the case, that the patient will be deaf in the affected ear; but it is a point which is apt to be overlooked now and then.

Tenderness is the third sign. Notice three points where the tenderness occurs. One of these points is over McEwen's triangle (demonstration), which is above and behind the meatus, and can be felt as a slight depression, if you press close to the auricle just below the supra-mastoid crest. Hard pressure normally does not produce pain there. The second point is the tip of the mastoid. You can feel that quite easily, particularly if you relax the sterno-mastoid by putting the head a little forward. The third point is just behind the mastoid process. It is important to examine for tenderness in these three positions, because in some cases tenderness may be completely absent over McEwen's triangle, but very definitely present over the tip of the mastoid process. You already have seen that the cells at the tip of the mastoid process may be larger than those in the upper part, and the tenderness noticed at the tip of the mastoid is due to the infection and the suppuration within these cells.

The fourth sign is thickening of the tissues over the mastoid process. This thickening may be very slight, and in order to detect it the two mastoid processes should be palpated from behind simultaneously while the patient is seated. It is possible in that way to feel a slight thickening of the tissues over the mastoid, which otherwise might be missed. Feel over McEwen's triangle, at the tip of the mastoid, and behind the mastoid. Thickening about the tip of the mastoid process is most important, and is most easily appreciated by placing a finger underneath the tip of the process. Normally, the finger can be pressed so much beneath the process that a sensation is produced of being able to lift up the head; in the case of an inflamed process this sensation is no longer produced, for the finger is prevented by the thickening of the tissues from getting under the tip of the mastoid.

The fifth sign is a pushing down of the posterior superior deep meatal walls, and in order to appreciate this point we must refer again to the anatomy. Notice the position of the antrum in relation to the bony meatus; it is very near the posterior superior deep meatal wall; suppuration inside the

antrum may produce thickening of the soft tissues over its outer wall, over McEwen's triangle, as we have seen; similarly, it may produce thickening of the deep posterior superior meatal wall, its anterior wall. As the disease progresses, the thickening due to inflammation of the periosteum and soft tissues superficial to it becomes more marked, and can lead to oedema over the mastoid process, and later to a subperiosteal abscess.

The sixth sign is perhaps as important as any of the preceding five, but is so vague as to be the most difficult to describe accurately. It comprises many points in itself, being the general condition of the patient. The condition of the patient really depends on two factors—the virulence of the infecting organism, and the resistance offered to that infection. Some patients are acutely ill with a condition of septicæmia, others are scarcely ill at all.

Individual symptoms are variable; amongst these are pain in the ear, headache, malaise, nausea or vomiting, and rise of temperature.

Almost all patients complain of some pain in the ear, or over the mastoid process. In some patients, it is so slight as to be unnoticeable, more so in children; in other cases, pain is the prominent symptom, and so severe that it prevents sleep. In one of the cases to be quoted later, pain determined the diagnosis; it is interesting to note that operation in such cases frequently discloses the dense or diplöetic type of mastoid.

The temperature is in the majority of cases but slightly raised; even when operation discloses extensive suppuration throughout the mastoid process, the temperature is seldom higher than 100° F. or 101° F. In those cases in which the temperature is as high as 103° F., some complication must be suspected—either a condition of general severe infection, septicæmia, or an infection of the lateral sinus.

Malaise is usual in some degree, headache, loss of appetite, and even nausea, or it may be so slight as to give rise to a feeling of lassitude only. Some patients have such slight constitutional disturbance that they continue their usual occupations; one patient, who was a clerk in the War Office, continued her work, and indeed obtained promotion, while

suffering from extensive suppuration in the mastoid cells.

In the presence of all these six signs, there will be very little difficulty in diagnosing the condition as acute mastoiditis. But if only one or two of these signs are present, diagnosis may present considerable difficulty.

The following cases illustrate various types of acute mastoiditis.

The first is that of a nurse who developed a severe suppurative otitis media. This was the result of nursing a patient with an extremely septic tonsillitis, and almost at once the infection passed along the Eustachian tube to her middle ear and probably to her antrum, because she was tender from the first over McEwen's triangle. The membrane was freely incised, and pus came out under pressure. During the next two or three days, the tenderness over McEwen's triangle increased, and became marked at the tip of the mastoid process; the superficial tissues became thickened. The patient had some pain and a little rise of temperature. In view of this combination of signs, there was no doubt as to the diagnosis of acute mastoiditis, and operation disclosed extensive suppuration. Recovery was uneventful. This case was a typical instance of acute mastoiditis, in which infection of the antrum and cells took place within a few hours of the onset of the acute suppurative otitis media.

The next case is that of a young lady of 16 years of age, in whom the disease produced very slight signs. On the 16th of April, she had a slight sore throat, from which she recovered in a few days. During her convalescence she developed a high temperature— 102° and 103° ; she had no symptoms to account for this rise of temperature, except a very slight inconvenience in one ear. On examination, the right tympanic membrane was found to be red and slightly bulging outwards.

Paracentesis was performed, and thin pus escaped; this was followed by rapid fall of temperature. During the next 10 days the temperature never rose above 99.2° F., and, on the three or four succeeding days it was normal.

The discharge, however, persisted in spite of most careful treatment. During this time she was in bed; she felt well, and

had a fair appetite, but when she tried to get up she felt very tired, and did not want to sit up for more than an hour or two. Had the case been one of simple acute otitis media, the patient ought by this time to have been well, and the flow of pus should have stopped or have greatly diminished. No real tenderness of her mastoid process was elicited at any of the three points previously mentioned; all the patient would confess to was that pressure applied equally to both mastoids felt greater on the affected side. She was an extraordinarily good patient—too good. The diagnosis of suppuration in the mastoid process was made on the continuance of discharge, the fact that the patient was not as well as she should have been, and on the very slight tenderness over the bone. Operation was performed, and disclosed most extensive suppuration throughout the mastoid process; all the cells were diseased to the tip of the mastoid process, as far back as, and even behind, the lateral sinus, which was exposed and a very early extradural abscess found. She made a good recovery.

Here is another very interesting case, but with a very different series of signs and symptoms. This patient was a young man, æt. 18, who had enlisted. He was in camp in December, when, it will doubtless be remembered, the weather was appalling. He, in common with others, got an extremely bad sore throat, and was in hospital. While in hospital he developed acute otitis media on both sides; this was ushered in with severe vomiting and a temperature of 103° F. and 104° F., and he was very ill. On examination four days after the onset of the otorrhœa, there was a most profuse discharge of pus with some tenderness over the mastoid processes, but the membranes were red and bulging as though there was some pressure still in the tympana. After incision of the membranes the temperature remained high, and the discharge continued as profuse as before.

Since incision of the membranes brought no relief from the symptoms and the mastoid tenderness increased, operation was performed 48 hours later on the left side. This was only seven or eight days after the beginning of the otitis media, but the whole mastoid process was riddled with pus from the tip of the mastoid to the extreme upper part of the mastoid, and in the cells behind the lateral sinus. In spite of

the operation, the temperature still remained at 103° and 104° . The other mastoid was also operated upon, and a precisely similar condition found to that on the left side. After the operations the temperature remained very high, and the patient was extremely ill for several weeks, but eventually he recovered completely; this was certainly assisted by the injection of autogenous vaccines of streptococcus longus, the infecting organism. This was doubtless a case of severe general infection combined with marked local reaction.

The fourth case is that of a student, who developed acute otitis media on the right side. From the first day of his illness, he suffered from severe pain in the ear; the membrane was incised, and pus escaped. The temperature, at first $101^{\circ} \cdot 6$ F., fell in two days to normal, and thereafter was subnormal. In spite of the drainage through the membrane severe pain persisted, mostly in the ear, but partly about the mastoid process. A hot coil on the ear, fomentations, and drops of glycerine and carbolic, as well as large quantities of aspirin, failed to relieve him. He developed slight tenderness on firm pressure over McEwen's triangle, about eight days after the onset of the otitis. On account of the pain, the continued slight discharge of pus, and the deep tenderness, operation was performed. There was pus in the antrum, and in one or two cells just superficial to the antrum. The mastoid process was of the diplöetic type, the very hard type, which is the reason, no doubt, why he had so much pain, because what pus there was had no possible chance of extending through the mastoid process. His pain ceased soon after the operation, and he got perfectly well.

The fifth case is that of an old gentleman, aet. 71, who had had, five or six weeks previously, an acute suppurative otitis media on the left side. His doctor had treated him, and the discharge had diminished; the patient never kept his bed, but had walked about as usual. When seen six weeks after the onset, there was a profuse discharge of pus from the ear, and definite thickening of the soft tissues over the mastoid process. The temperature was not raised, and the patient was feeling perfectly well. Diagnosis of acute mastoiditis was not difficult, and operation was performed. The disease had extended completely through the mastoid process, and behind his lateral

sinus, and there was a considerable sequestrum in the middle of the mastoid process. This case emphasizes the fact that sometimes these patients with extensive suppuration in the mastoid process have no symptoms of constitutional disturbance. A further example of this is afforded by the case of a woman who attended in the out-patient department last year. For three or four weeks, she had had a profuse discharge of pus from her ear; there was some thickening of the soft tissues over the mastoid process, and tenderness, so that the case was evidently one of acute mastoid disease. When operation was performed, not only was the lower part of the mastoid process found destroyed by suppuration, but there was as well a very large extradural abscess on the lateral sinus. The patient had had but one day's headache, had not kept her bed, but had carried on her household work, and had been behaving exactly as if she were normal. So it will be seen that in some of these cases the general symptoms are practically negligible.

The differential diagnosis of acute mastoiditis must now be considered.

There are three conditions which may give rise to difficulty—

1. Furunculosis of the external auditory meatus.
2. Lymphadenitis of the mastoid glands.
3. Herpes of the auricle and pain accompanying a facial paralysis.

1. *Furunculosis of the external auditory meatus.*—Boils in the external auditory meatus sometimes give rise to œdema of the tissues over the mastoid process, and this is so pronounced in some cases, particularly in adults, that the auricle may be displaced downwards and forwards, exactly as in some cases of acute mastoiditis. The main features in favour of furunculosis are:—(a) presence of the boil in the meatus, though this does not exclude the possibility of an otitis media; (b) pain on moving the prima, absent in a case of mastoiditis; (c) tenderness in the preauricular region, due to gland infection; (d) the tenderness over the swelling behind the ear, if present, is more marked on pressing in a forward direction against the auricle than deeply on to the bone; (e) the history of the case, the onset of the pain

being gradual and becoming worse, whereas in acute otitis the onset is sudden, and often disappears or becomes less on rupture of the membrane; (the patient may, too, have had boils in other parts of the body); (*f*) hearing almost normal.

In cases in which a suppurative otitis media is accompanied by boils in the meatus and a swelling over the mastoid process, diagnosis can only be made by keeping the patient under observation and treatment for a day or two.

2. *Lymphadenitis of the mastoid glands*.—One or two very small glands can normally be felt over the mastoid process, and these may be infected from septic conditions of the scalp and hair. The swelling, redness, and oedema resulting may give rise to considerable difficulty, particularly in cases in which there is already an otorrhœa. Discovery of a focus of infection will be of great help in arriving at a diagnosis.

3. *Herpes of the auricle and pain accompanying a facial paralysis*.—Herpetic spots over the auricle, due to posterior poliomyelitis of the second cervical nerves, give rise to very severe pain and tenderness about the ear; the pain and tenderness may persist after the vesicles have dried up. The condition is entirely analogous to herpes zoster, and, as in that condition, the glands draining the affected area may become enlarged.

The following case is a good example of the condition, and illustrates the close similarity to acute mastoiditis. A doctor in charge of a soldier in a Red Cross Hospital gave me the history of the case, with a request that operation should be performed for acute mastoiditis. "For a week or more the man had had pain in the right ear, sufficient to keep him awake and necessitate opiates; there was marked tenderness over the mastoid process, a swelling below the tip of the process, and the temperature was slightly raised; the patient was also deaf in that ear." This history was very suggestive of acute mastoiditis, except for one feature—there was no discharge from the ear mentioned. The man was seen the next day when prepared for operation. There were then noticed, on his auricle, the scars of some herpetic spots, and on looking at his tympanic membrane, that was seen to be absolutely normal. There was certainly extreme tenderness over the mastoid process, and there was a gland to be felt below the

tip of the mastoid process. In addition, he was deaf. So here we had all the signs and symptoms of acute mastoiditis, except the presence of pus from the ear.

Allied probably to cases of herpes are the cases of severe pain in the ear accompanying Bell's paralysis. Cases of this affection are occasionally sent into hospital for operation on the mastoid process.

As soon as a diagnosis of acute mastoiditis is made, the treatment is clear: operation. The operation to be performed is Schwartz's; this consists in opening the antrum, and all the cells and spaces in the bone found to be infected. It is unnecessary to enter into details of the operation.

Just a word about prognosis. The prognosis in an uncomplicated case of acute mastoiditis is extremely good, both from the point of view of the patient's life and with respect to his hearing. The hearing, usually reduced almost to nil by the acute otitis, as a rule becomes perfectly normal again after operation.

In connection with prognosis, it should be added that in a case in which the diagnosis is doubtful, it is far better to operate than not; there will be very few cases in which operation will be regretted. In cases in which operation is not performed, regret may come too late.



PERMEATING MASTOIDITIS.

By J. B. PIKE, M.R.C.S.

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MASTOID infection has always been a sort of *terra incognita*. Fortunately, the opportunities for post-mortem examination are not common, and the conditions then found are of such disorganization that the course of events is difficult to trace definitely.

We may, I think, lay down the following axioms:—

1. That the infection is microbic.
2. That it reaches the mastoid antrum through the aditus.
3. That the infection, with consequent inflammatory reaction, may spread in three directions: outwards, behind the meatus; upwards, to the cerebral surface of the petrous bone; and backwards, towards the lateral sinus.

The spongy character of the mastoid lends itself readily to infective permeation, which may be due either to infective pus from the middle ear or to the passage of bacteria into the mastoid cells. When the infection is due to middle ear abscess, the drum is, as a rule, perforated, and there has been for some time a chronic purulent discharge. When bacterial infection passes through to the mastoid with but little middle ear mischief, the symptoms are masked, and the case is much more difficult and insidious.

Dr. Hardwicke reports in *THE PRACTITIONER* for June 1915 a somewhat typical case of mastoid infection without middle ear mischief. Fortunately, the course of the infective process was outwards, and the case was easily relieved by operation. If the course taken had been upwards to the cerebral surface, the condition which I have described as Permeating Mastoid Meningitis would probably have arisen, and the case would have been more serious and difficult to diagnose.

Mastoiditis usually gives rise to caries of the spongy mastoid bone, and seeking the surface in one or more direc-

tions sets up a periostitis, proceeding to suppuration. It may, however, give rise to compact osseous tissue being formed, and it is not very uncommon to find layers of ivory-like consistence surrounding the foci of disease.

Mastoid infection may be very chronic, the bacteria lying in wait as it were for the opportunity of lessened resistance to invade surrounding tissues. In one of my cases, published in the *Lancet*, scarlatinal poison lay dormant in the mastoid cells for months after recovery, and then set up a reflex middle ear abscess, mastoid caries, periostitis, and, which was proof of the nature of the infection, secondary scarlatinal nephritis.

In the light of the many mastoid cases which have been reported, it is evidently of the highest importance not only to have a clear mental picture of the progress of infection and its methods, but to classify them as well somewhat as follows :—

1. Abscess of middle ear with secondary mastoid infection through the aditus.
2. Microbic infection of the mastoid making its way towards the external periosteum.
3. (The most insidious and dangerous) microbic infection permeating the mastoid bone in the direction of the periosteum of the cerebral surface, threatening meningitis and brain abscess.
4. Combined with the above infection passing backwards towards the lateral sinus, and causing thrombosis and septicæmia.



NUCLEAR SEGMENTATION OF NEUTROPHILE LEUCOCYTES IN HEALTH AND DISEASE.

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WHEN normal fresh human blood is submitted to microscopical examination, a small number of colourless, more or less amœboid cells are seen suspended in the plasma amidst a much larger number of red blood-corpuscles. These colourless amœboid cells constitute the white blood-corpuscles or leucocytes. In the microscopical examination of specimens of fresh blood, it is only on most careful scrutiny that differences can be detected amongst these cells, and a great advance in the study of their morphology and functions was made when Ehrlich applied to them special methods of fixation and staining, chief amongst which was his Triacid stain. The discovery of the Romanowsky double stain, and of its more recent modifications by Jenner, Giemsa, and Leishman, has added greatly to our knowledge of this subject, and to the ease and accuracy with which the various types of leucocyte can be recognized.

This differentiation is based partly on morphological considerations, *e.g.*, the size of the cell, the size and shape of the nucleus, and partly on the hyaline or granular appearance of the cytoplasm. For this purpose, Ehrlich ascertained the affinity of these granules for certain aniline dyes, according to their acid, basic, or neutral characters.

An *acid* dye, in Ehrlich's sense, is usually a salt in which the colouring matter plays the part of an acid radical, *e.g.*, eosin, which is the sodium salt of the coloured acid tetrabromfluorescein.

A *basic* dye is similarly a salt in which the colouring matter plays the part of a base, *e.g.*, methylene blue, which is the chloride of the coloured base tetramethyldiphenylthiazine.

A *neutral* dye consists of a combination of a coloured acid

with a coloured base, *e.g.*, eosinate of methylene blue.

Those granules in the cytoplasm of the leucocytes, which show an affinity for, and stain readily with, acid dyes, were termed by Ehrlich acidophile or eosinophile; those which stain readily with basic dyes were termed basophile, whilst those which stain only with a mixture of acid and basic dyes were termed neutrophile.

The most abundant of all the leucocytes of the blood under normal conditions contains within its cytoplasm large numbers of very fine neutrophile granules, and is termed the polymorpho-nuclear neutrophile leucocyte. They constitute about 70 per cent. of the leucocytes in normal blood, whilst a still larger proportion is found in certain pathological conditions, especially in the inflammatory leucocytoses. Functionally, its most striking characteristic is its marked phagocytic power and the production of an intracellular enzyme, named by Metchnikoff "*microcytase*," which brings about the destruction and subsequent digestion of the phagocytosed bacteria. On the other hand, the most striking morphological characteristic of this variety of leucocyte is the variable shape and appearance of its nucleus, which, whilst always single, may assume a great variety of shapes, being sometimes round, sometimes oval, and sometimes horse-shoe S- or Z-shaped. Hence, the name polymorpho-nuclear leucocyte, commonly abbreviated to polynuclear or polymorph, which is given to these cells.

The nucleus may also show segmentation of its chromatin substance into one or more parts or lobes, all of which are joined together by strands of chromatin, which may be quite thick or may be drawn out to the finest tenuity. On account of this tendency to division or segmentation, the nucleus may be uni-, bi-, tri-, quadri-, or multi-partite.

In 1904, Arneth pointed out that polymorphonuclear leucocytes with these various numbers of nuclear divisions are normally present in the blood in fairly constant proportions, and based his methods of classification of these cells on this fact. He divided the polymorphs into five classes: Class I., with uni-partite or undivided nucleus, consisting of one part; Class II., with bi-partite nucleus, consisting of two parts; Class III., with tri-partite nucleus, consisting of three parts; Class IV.,

with quadri-partite nucleus, consisting of four parts ; Class V., with multi-partite nucleus, consisting of five or more parts. Great elaboration resulted from a further sub-classification according to whether the nuclear divisions were round, oval, or loops, and according to the varying proportions of each of these shapes present. It would appear that this elaborate sub-division is unnecessarily complex, and that a sufficiently accurate and comprehensive neutrophile blood picture is obtained by the use of the above-mentioned five groups. In normal conditions, this neutrophile blood picture is remarkably constant, showing very little variation from the numbers given by Arneth. (Table I.)

TABLE I.—*Showing Arneth's Percentage of Leucocytes, arranged according to Number of Nuclear Segments in Normal Blood.*

—	Class I.	Class II.	Class III.	Class IV.	Class V.
Normal - - -	5	35	41	17	2 per cent.

In pathological conditions, and especially in the infective diseases, these numbers may show any degree of derangement from the smallest to the most profound, so that even whole groups may be missing.

In infective diseases, there is usually a marked increase in the percentage of polymorphs with uni- and bi-partite nuclei, and a corresponding decrease in the percentage of those with tri-, quadri-, and multi-partite nuclei. This neutrophile blood picture is spoken of as showing a "dislocation to the left" or a "deviation to the left." It has been observed, among other conditions, in pulmonary and other forms of tuberculosis, in pneumonia, in pleurisy, in typhoid, scarlet, and puerperal fevers, and in measles, diphtheria, and oral sepsis.

The following may be taken as examples of blood counts illustrating these facts. In some cases of pulmonary tuberculosis, I have found the figures set forth in Table II.

As examples of the findings in other infections, I take some counts given by Cooke in the *Journal of Pathology and Bacteriology* for April 1915, and arrange them in two tables, the general infections—typhoid fever, scarlet fever, measles and diphtheria in the one (Table III.), and the more localized ones

—tuberculous conjunctivitis, primary laryngeal tuberculosis, gonorrhœa, and mild oral sepsis in the other (Table IV.).

TABLE II.—*Pulmonary Tuberculosis, showing an Increase in the Percentage of Polymorphs with One or Two Nuclear Divisions and Decrease of these with more Divisions.*

Pulmonary Tuberculosis.	Class I.	Class II.	Class III.	Class IV.	Class V.
Case 1 - - - -	18	64	17	1	0
" 2 - - - -	10	53	25	12	0
" 3 - - - -	18	46	22	10	4
" 4 - - - -	31	57	10	2	0

TABLE III.—*Showing the Number of Nuclear Segments in the Leucocytes in certain General Infections.*

Disease.	Leucocytes.				
	Class I.	Class II.	Class III.	Class IV.	Class V.
Typhoid Fever - -	47	33	20	0	0
Scarlet Fever - -	34	38	26	2	0
Measles - - - -	51	30	19	0	0
Diphtheria - - -	40	35	24	1	0

TABLE IV.—*Showing the Number of Nuclear Segments in the Leucocytes in certain Localized Infections.*

Disease.	Leucocytes.				
	Class I.	Class II.	Class III.	Class IV.	Class V.
Gonorrhœa - - -	19	32	36	12	1
Laryngeal Tuberculosis -	16	36	38	9	1
Tuberculous Conjunctivitis - - -	9	45	38	8	0
Mild Oral Sepsis - -	26	38	30	6	0

A comparison of the figures in Tables III. and IV. would seem to indicate that the amount of dislocation of the polynuclear count, being more marked in the general than in the local infections, is directly dependent upon the degree of

toxæmia.

This method of recording blood-counts is also of some value in the prognosis of infective diseases, as is shown in the following tables from *Evans' Journal*, July 1913, in which we can compare the counts in a severe case of pneumonia, which

TABLE V.—*Pneumonia ending in Recovery.*

— — —	Class I.	Class II.	Class III.	Class IV.	Class V.
2nd Day - - -	61	29	9	1	0
8th „ - - -	56	37	6	1	0
11th „ (lysis) - -	23	46	23	6	2
15th „ - - -	8	46	42	3	1
24th „ - - -	17	40	32	9	2
40th „ - - -	Discharged.		—	—	—

ended in recovery although resolution was slow and lysis extended over four days (Table V.), with that in a fatal case of pneumonia (Table VI.).

Again, the blood-counts in a case of angina with fever, which was followed by a measles-like exanthem and slight

TABLE VI.—*A Fatal Case of Pneumonia.*

— — —	Class I.	Class II.	Class III.	Class IV.	Class V.
1st Day (rigor) - -	18	52	22	7	1
2nd „ - - -	41	36	18	4	1
4th „ - - -	18	63	18	1	0
6th „ - - -	32	59	7	1	0
8th „ - - -	40	52	7	1	0
10th „ - - -	32	53	15	0	0
12th „ - - -	Died suddenly.		—	—	—

fever, and recovered after three administrations of anti-diphtheritic serum (Table VII.), may be compared with those found in three fatal cases of diphtheria (Table VIII.).

This behaviour of the leucocytes is explained by Arneth in accordance with his views on the development and life cycle of these cells. The neutrophile leucocytes are developed from the myelocytes of the bone-marrow, and at first possess an

TABLE VII.—*Angina with Fever ending in Recovery after the Administration of Anti-diphtheritic Serum.*

—	Class I.	Class II.	Class III.	Class IV.	Class V.
End 1st week - -	23	70	7	0	0
„ 2nd „ - -	38	57	14	1	0
„ 3rd „ - -	34	49	16	0	1
„ 4th „ - -	12	63	21	3	1
„ 5th „ (rash) -	24	58	17	1	0
„ 6th „ - -	9	56	29	10	0

TABLE VIII.—*Three Fatal Cases of Diphtheria.*

—	Class I.	Class II.	Class III.	Class IV.	Class V.
Case 1, 2nd Day (Death)	65	28	7	0	0
„ 2, 2nd „ „	65	27	7	1	0
„ 3, 3rd „ „	49	49	2	0	0

undivided nucleus. Later the nucleus divides, and the nuclear division becomes greater with increasing age, so that the cells of Class V. are the oldest, being older than those of Class IV., which are older than those of Class III., and so on. Now, toxæmias bring about destruction of neutrophile leucocytes, the disintegration affecting the older leucocytes, so that the forms possessing the most divided nucleus disappear first from the blood. Hence, the neutrophile blood picture may be taken as an index of the severity of the intoxication. If this explanation of Arneth be correct, it may be assumed that the general functional activity of the neutrophile leucocyte will vary with age, and therefore with the amount of nuclear division present in these cells. In a series of 42 opsonic index determinations with the staphylococcus pyogenes aureus, in which 4,183 leucocytes and 6,340 organisms were enumerated, I have taken the phagocytic activity of the leucocytes as an index of their functional activity (Table IX.).

These results are shown more strikingly in the abbreviated table (Table X.).

Table X. clearly shows that the neutrophile leucocyte of

Class I. with undivided nucleus possesses a moderate power of phagocytosis; that this power of phagocytosis reaches a maximum in the leucocyte of Class II. with bi-partite nucleus, and then

TABLE IX.—*Number of Leucocytes and Ingested Organisms in 42 Opsonic Index Determinations.*

Nuclear Segments of Leucocytes.	Class I.	Class II.	Class III.	Class IV.	Class V.
Organisms - - -	569	2,744	2,321	625	81
Leucocytes - - -	409	1,758	1,531	425	60
Average organisms per cell - - - -	1.39	1.62	1.51	1.47	1.35

progressively diminishes as the nuclear division increases, being lowest in the cells of Class V. with multi-partite nuclei. It

TABLE X.—*Showing the Number of Ingested Organisms per Leucocyte.*

Leucocytes.	Class I.	Class II.	Class III.	Class IV.	Class V.
Ingested Organisms per Leucocyte - - -	1.3	1.62	1.51	1.47	1.35

would therefore appear that by taking phagocytic power as an indication of functional activity, and this again as an indication of the age of the cell, the neutrophile leucocytes with undivided nuclei are young and immature, those with bi-partite nuclei have reached adult life and possess full functional power, and that thereafter progressively increasing nuclear division indicates increasing age and diminished functional activities.

We may thus conclude that the views promulgated by Arneth, on the relationship between the age and functional power of the neutrophile leucocytes and their behaviour in the various toxæmic conditions, are probably correct.

Finally, it may be claimed that this method of enumeration of the neutrophile leucocytes places some new information in the hands of the practitioner, and provides him as well with some valuable indications in the diagnosis and prognosis of the various infective diseases.



THE DANGERS OF TUBERCULIN.

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THE most remarkable attribute of tuberculin is its selective affinity for tuberculous tissues, in which it shows its specific energy by causing definite inflammatory changes, accompanied by fever and other symptoms varying with the dose. This peculiar property arrests our attention, because we know no other substance possessing this selective and circumscribed action on diseased tissues.

The extraordinary improvement in lupus after injections of tuberculin indicates that in some way tuberculin, by exciting inflammation, helps the tissues to resist the morbid process. Not only in lupus, but in tuberculous lesions of the skin and mucous membranes, especially of the larynx, which can be directly observed by the naked eye, a process of healing occurs under the influence of tuberculin, which cannot be attributed to chance. Moreover, in pulmonary tuberculosis the very favourable effect of tuberculin upon hæmorrhage, upon the absorption of fluid in pleurisy, and in causing the diminution and cessation of sputum as well as the disappearance of tubercle bacilli from any sputum that remains—events that harmonize with the tissue changes observed post-mortem in tuberculous animals treated with tuberculin—constitutes *primâ facie* evidence that tuberculin not only selects tuberculous tissue, but has a definite curative effect upon the lesions.

In spite of these facts, which can be demonstrated by a properly conducted series of experiments, such as are being carried out in large numbers by those who use tuberculin as a remedy in tuberculosis, a deeply rooted idea exists in the minds of many medical men, particularly among those whose first and only introduction to tuberculin was in the years 1890–1891, that tuberculin, far from exerting a curative effect, causes aggravation and even extension of the disease by

mobilization of tubercle bacilli. These two views regarding the action of tuberculin are irreconcilable and mutually destructive. Either tuberculin exerts a favorable or an unfavorable effect.

Let us first try to explain why those medical men, who used tuberculin in the years 1890-1891, are still, as the result of their experience in those years, the most persistent antagonists of tuberculin treatment.

In England, this school of opposition is specially identified with the physicians of Brompton Hospital of that period, who were ready to issue a condemnatory report after less than six months' experience. Is it not reasonable to suppose, as it is possible, that some accident was responsible for this condemnation? Since that time, many men have acquiesced in the judgement then meted out to tuberculin, without having had any experience of their own. On the other hand, men of equal authority and far greater experience, who came into possession of a special knowledge not yet revealed by science to those observers in 1890, have constantly repudiated the doctrine of danger, and demonstrated in practice the beneficial effects of tuberculin.

It is hardly open to question, that the unknown factor of mixed infection was the sunken rock upon which the observations and conclusions in 1890 were shattered. There are those who still think that mixed infection, connoting a definite group of infective processes, plays but a subsidiary part in pulmonary tuberculosis. I must ignore such views because bacteriological science proves that pulmonary tuberculosis is, in the main, a remarkably insidious, slowly progressive disease, until streptococci, pneumococci, staphylococci, and influenza bacilli, singly or in combination, enter upon the scene of action and display their own violent activity.

In 1890-1891, mixed infection enacting this rôle was still undiscovered, and its supreme importance inevitably unrecognized. In the intervening years, bacteriological science has set upon a sure foundation the modern doctrine of mixed and secondary infection.

By a fatal, fortuitous coincidence, tuberculin was exploited in the treatment of tuberculosis at the very time that influenza overspread Europe, and indeed the whole world, in pandemic

form. Influenza of specific type, caused exclusively by Pfeiffer's bacillus, affects notably the respiratory tract, and in its typical form presents a very characteristic and almost distinctive clinical picture. Even in persons otherwise healthy, this form causes very severe catarrh in the nose, naso-pharynx, larynx, and bronchial tubes, which rapidly becomes purulent, and the abundant purulent secretion from these tracts is a very striking feature.

The onset of the attack, often strikingly sudden and severe, is ushered in by a rigor or marked chilliness and a rapid rise of temperature to 102° , 103° , 104° , often with well marked herpes of the lips and around the nasal orifice, and accompanied by extreme toxæmia in the form of profound prostration of strength and drenching sweats. This is the typical picture of acute specific influenza due to Pfeiffer's bacillus. Even in the lungs, the inflammation may spread to the finest bronchioles, which become plugged with purulent masses. This bronchiolitis, may spread to the pulmonary tissue and cause broncho-pneumonia. In the true influenzal form, these purulent plugs, if stained in smear preparations, disclose myriads of influenzal bacilli in pure culture.

This severe type of influenza exhibits a special malignancy in lungs already tuberculous, and the influenza bacilli cause rapid caseation, leading to extensive softening and disintegration in the tuberculous areas. Here is the unknown factor—mixed infection—which misled and deceived those who experimented with tuberculin during 1890-91. Nor can we wonder that the Brompton Hospital report failed to evolve truth, with the portentous factor of mixed infection still an unsolved mystery.

These conclusions of the clinical physicians at Brompton Hospital received the "imprimatur" of the most eminent pathologist of the age—Professor Virchow—who supported the idea that tuberculin might be a dangerous, instead of a helpful, agent in the diagnosis and treatment of tuberculosis. The shadow of his great name has further obscured this problem by unsound conclusions, having their origin in the simple fact that this then unknown factor—mixed infection—had obtruded itself at the autopsy and was entirely misinterpreted. Virchow called attention to a number of small submiliary nodules in cases of pulmonary tuberculosis treated with tuberculin, and

attributed these fresh young tubercles to the action of tuberculin. Subsequently, he observed these very same submiliary lesions in cases of pulmonary tuberculosis complicated with influenza, *in which no tuberculin at all had been given.*

Since we do not hear any longer of rapid and sudden deaths, with the presence of these submiliary nodules at the post-mortem examination, in any cases treated with tuberculin, now that influenza is an uncommon occurrence, we have learnt that these submiliary nodules are the expression of the effect of influenza invading the tuberculous focus rather than of doses of tuberculin. But Virchow went still further, and propounded the idea that tuberculin mobilized tubercle bacilli in tuberculous tissues, and scattered them in the tissues around to start fresh submiliary tubercles.

Yet I am convinced beyond all doubt that anyone, who investigates the histories of many cases of tuberculosis treated in all stages by large doses of tuberculin, would simply be astounded by the evidence which both discounts and discredits this hypothetical danger from injections of tuberculin. The widespread currency of this view has its origin in but a few casual observations of Virchow's, which cannot be reconciled with my experiences, extending over a quarter of a century, not in a few isolated cases occurring during an epidemic of influenza, but in thousands of cases of pulmonary tuberculosis treated with many and very large doses of tuberculin. Such experiences are of far greater value as evidence on this particular question than a few post-mortem observations made by Professor Virchow, at a time when the idea of an influenzal infection had not entered his mind.

It is remarkable that since Virchow published his observations at the time of the influenza outbreak, there has been no authentic report of similar changes in cases terminating fatally, that had been treated with tuberculin. On the other hand, deaths rapidly supervening after injections of tuberculin are so rare, that on this count alone Virchow's views cannot be credited. During the influenza epidemics, many of these deaths were recorded. When Virchow argued in favour of the view, that these fresh deposits had been excited by the tuberculin, he had not the remotest conception of the phenomenon of a mixed infection, and inevitably such an acute focus of fresh inflammation, as

we know now to be the constant lesion of influenza invading a tuberculous area, was misinterpreted by him, because he was quite unsuspecting of its true nature and origin.

It is well known that, in a mixed infection, tuberculin may increase the intensity and even the extent of the inflammation in a tuberculous focus, and that is one of the primary reasons for withholding tuberculin in mixed infections of this nature. But this fact in no way proves, that tuberculin may irritate a tuberculous focus in such a way as to dislodge and disseminate tubercle bacilli through the tissues in tuberculous areas; it merely shows that the inflammation favours the progress of the secondary infection.

While tuberculin may, by causing inflammation, favour healing in a tuberculous focus by the specific production of anti-bodies, the inflammation itself as a *locus minoris resistentiæ* may favour the secondary infection, because tuberculin is specific in its effects, and cannot aid the tissues in resisting the action of streptococci, influenza bacilli, or other agents of mixed infection. This doctrine of mixed infection, therefore, gives the simplest, clearest, and very reasonable basis for the practice of postponing the use of tuberculin until the secondary infection has been successfully combatted. Herein lies the supremely important function of sanatorium methods.

It is an accepted doctrine that the tuberculous lesion is, in essence, the reaction of the tissues to the activity of the tubercle bacilli, and this reaction of the tissues is the essential process by which the healthy tissues are protected from the infective agents. By this reaction, leucocytes are brought into play, and active karyo-kinesis of the fixed tissues of the organ leads to the production of new cells ending in formative processes, of which fibrosis is the surest means of resisting the invasion of near and distant parts by tubercle bacilli. Slowly, but surely, this productive reaction of the tissues may be stimulated and intensified by graduated doses of tuberculin.

That these changes tending to fibrosis do occur, is positively demonstrated by the post-mortem conditions observed in the tuberculous tissues of animals treated with tuberculin. This evidence has been furnished not only by Koch, but in a very striking manner by Kitasato, as well as by Marx and Loeffler; but the most conclusive evidence is found in the

remarkable improvements that occur in cases of pulmonary tuberculosis and in other tuberculous lesions, especially in bones and joints and organs accessible to direct observation, such as the larynx, the throat, the iris, and the bladder. The changes in pulmonary tuberculosis are expressed in the marked improvement in the physical signs, with the disappearance of râles (and effusion in cases of pleurisy), and in the marked changes observed in the quality and quantity of the sputum.

Moreover, the very favourable influence exerted in cases of hæmorrhage, in which tuberculin almost acts as a specific, and the far greater frequency of the disappearance of bacilli from the sputum in pulmonary tuberculosis under tuberculin treatment, force an unbiassed observer to the conclusion that tuberculin exercises a definite healing effect upon the diseased tissues. One can watch the healing of ulcerated surfaces in the larynx, in the fauces, and, most strikingly, in old established sinuses connected with tuberculous foci in bones and joints. I have also reported the very remarkable case, in which no less than six definite ulcers on the mucous membrane of the bladder cicatrized completely and permanently after a long course of treatment with, ultimately, large doses of tuberculin.

Now, it is surely obvious that if this evidence in favour of the curative effect of tuberculin upon tuberculous lesions can be established, it is fatuous to conjure up this false and mischievous doctrine of the mobilization of bacilli after doses of tuberculin, unless evidence far more convincing than Virchow's observations can be brought forward in favour of this doctrine.

What is meant by mobilization, and what are its clinical signs and symptoms? It is conjectured by some, that any fresh physical sign, especially in the form of râles, is evidence of fresh trouble in a hitherto healthy area. I can merely reply, that it is extremely easy to make mistakes of this sort in diagnosis by paying too exclusive attention to changes in the character, abundance, or extent of râles. There may be very extensive tuberculous disease without any râles, and there may be an extraordinary variety of râles without any evidence of progress of the disease. Much more important than these râles are the character and quantity of the expectoration, and, as I have stated, the very striking improvement in the quality and character of the expectoration, as the result

of tuberculin treatment, is the most satisfactory proof that the actual conditions of the diseased areas have been in the direction of improvement.

In short, I defy any expert authority on physical signs to prove, by the indirect and very imperfect methods of physical examination, that properly administered doses of tuberculin ever cause such changes in the tissues as positively indicate extension of the disease to the healthy areas. The disease extends to fresh areas, and as it progresses the physical signs of the underlying conditions of tissues are constantly changing. But it would require a genius to be able to compare the changes in physical signs, that do occur in tuberculous areas *without tuberculin*, and those which may be observed in cases treated *with tuberculin*, and to differentiate these changes so as to be able to say whether or not the disease had extended.

In testing the effects of tuberculin in treatment, one must have a clear and accurate conception of the usual progress of the tuberculous lesions in the lungs when tuberculin has not been used, before one can attempt to predicate any unusual progress. Herein lies a substantial difficulty.

The progress of tuberculosis in the lungs is not only variable in intensity and extent, but the very signs by which we attempt to gauge the amount of progress or retrogression cannot be assessed and recorded with any degree of mathematical accuracy. If a number of skilled, trained observers, competent authorities upon physical signs in the abstract, were to attempt to give an accurate description of the extent and character of the various and manifold changes that characterize a progressive tuberculosis of the lungs, when the opportunity could be given of verifying their observations and checking them post-mortem, there would be inevitably very wide discrepancies, inconsistencies, and inaccuracies in all of these observations, especially in those stages of the disease when tuberculin would be exploited.

Every clinician knows, that in a series of cases under the same treatment and conditions the course of the tuberculous process follows no definite law, but knows every sort of caprice and irregularity. In one case, the process may sweep through a lobe with the rapidity and acuteness

of a pneumonia. In another case, scattered foci of variable size may be superimposed, one over the other, or be arranged laterally, or in circles, and these lesions may vary in depth, in breadth, or in height. They may be at the very surface, or separated from the surface by layers of more or less healthy tissue, or may even be at such a depth that they can give but little evidence of their existence by methods of observations which can only be practised at the surface. In other cases, the lesions, though multiple and numerous, may be so small as to escape detection by the ordinary methods of physical examination.

No doubt in some of these cases X-ray pictures and photographs may give some approximate precision. But X-ray pictures may chiefly measure the degree of caseation, or fibrosis, or of cavity formation. One cannot expect therefrom any accurate revelation of early lesions, nor can one measure the intensity or extent of the acute inflammatory process. Œdema, emphysema, bronchitis, or bronchiolitis, which so profoundly modify the auscultatory signs of the morbid states of the lungs, further increase the difficulty of accurate description, and these phenomena may be unrelated to the tuberculous process. It may be possible to record the extent and degree of impairment in the percussion note, and even to describe in accepted terms the auscultatory signs observed at a particular time. But these auscultatory signs depend upon such a medley of changing and mixed conditions, that one would hardly dare to interpret them in the terms of the conditions we suspect to be responsible for them. If, for instance, we take the most characteristic of all the signs—fine, crackling râles, or crepitations—it is by no means easy to explain their production or determine their true and exact nature.

Every text-book upon physical examination provides us with disquisitions on these very characteristic signs, but leaves us in uncertainty as to their nature and origin. Râles arising in diseased areas are so mixed, manifold, and variable, according to the state of the diseased tissues, their depth from the point of observation, the state of the intervening tissue, the state of the bronchial tubes of various areas, and the character and the secretion of the bronchial tubes traversing the tissues and in those traversing the healthy areas,

that their characters are liable to the most profound modifications even from moment to moment. A cough or many coughs, deep breathing, or a change in the state of the atmosphere may cause purely temporary and accidental modifications in the characters of these signs, so that it is futile to place much reliance upon these signs as means of measuring the intensity or progress of the disease. It is palpably a mischievous and misleading doctrine to suggest, that changes in the character or extent of these auscultatory signs can help us in assessing the influence exercised by tuberculin upon the local processes of tissue, or upon the deeper tissue changes which bring about immunity and tend to improvement of the morbid conditions.

The presence of a mixed infection profoundly alters the state of the bronchial tubes and the amount and quality of the expectoration, and, too often the occurrence of this accidental complication, with its altered physical signs, suggests this false idea that they are the effect of the dose of tuberculin, although they are merely simultaneous phenomena of independent origin. Thus, in assessing the dangers associated with any method of treatment, such as tuberculin treatment, we must clearly recognize the pitfalls in this path of inquiry that may lead us to entirely wrong and disastrous conclusions.

It is far safer to estimate the effect of treatment by stating carefully the improved conditions of the lungs indicated by the cessation of hæmorrhage, disappearance of tubercle bacilli from the sputum, and those well recognized changes in the quality and amount of the sputum, which obviously accompany progress towards health and recovery. It is, in short, dangerous to attempt to measure the favourable or unfavourable changes in lung tissues by the changes of the physical signs which may be interpreted so variously, and least of all by the modifications in the most capricious, most variable, and most indeterminate of all physical signs—auscultatory râles.

Avoiding, then, the pitfalls that beset us, if we place too much reliance on these physical signs as signs of intensification or extension of disease in the lungs due to this so-called mobilization of tubercle bacilli, we may proceed to adduce further strong evidence against the assumption, that such mobilization is favoured by injections of tuberculin. If this

mobilization occurs in the immediate neighbourhood of the diseased foci, it must also occur still more widely, and express itself with greater frequency than otherwise in general metastasis. If mobilization of tubercle bacilli were an effect of tuberculin injections, tuberculous meningitis would be more frequent in cases treated with tuberculin than in those treated without it. I can adduce evidence, which shows that tuberculous meningitis is less common when tuberculin has been used.

It is a sound assumption, that general metastasis in its worst form of tuberculous meningitis is an accurate index of the tendency of any procedure, whether surgical or therapeutic, to mobilize tubercle bacilli infesting tuberculous lesions in various parts of the body. Again and again it happens that in mobilization of tuberculous joints, after necessarily imperfect surgical operations upon tuberculous joints or bones or mucous membranes (rectum), or in lymphatic glands, metastasis has been followed by fatal tuberculous meningitis. In these operations, which frequently involve scraping and other crude methods which inevitably open up afferent venous and lymphatic channels by which material elements, such as tubercle bacilli, may be carried into near and distant parts by these channels, tubercle bacilli find their way into the general circulation, and, if in sufficient numbers, may lead to tuberculous meningitis.

In some cases, the tuberculous meningitis may be independent of this local injury of tuberculous tissue, but in many cases the tuberculous meningitis is the direct effect of the damage to the tissues around the tuberculous focus. The time of the occurrence of the meningeal symptoms after the injury varies, but a certain period of time must pass before the tubercle bacilli entering the afferent vessels can reach the brain tissues, set up their characteristic tissue lesions, and produce, mainly as the result of œdema and effusion, the series of symptoms which indicate invasion of the meninges. "In order to assume the causal relationship between injury and tuberculous disease, an interval of six to ten weeks must be allowed. That is the minimum time which the tubercle bacillus requires for a clinical manifestation of tuberculous disease of the brain after mobilization of tubercle bacilli."

(Cornet, p. 344.)

In tuberculous disease of the lungs, the path would be obviously shorter. Tubercle bacilli entering the pulmonary veins would pass directly to the left ventricle, and thence to the systemic vessels, including the cerebral vessels. In the case of damage to intestinal vessels, the tubercle bacilli travelling by the portal system would be caught in the first instance by the liver, and the chance of their reaching the systemic vessels would not be great. But it is far more likely that generalization occurs by the general venous system or the lymphatics. In the latter case, the circulation is slower, and lymphatic glands bar the way to rapid dissemination. The track of this extension by the lymphatics is well manifested in the state of the lymphatic vessels in the immediate neighbourhood of tuberculous ulcers of the intestine, and also in the lines of extension by the lymphatics in pulmonary tuberculosis. This transference of tubercle bacilli by the lymphatic channels through lymphatic glands, and finally by the main lymphatic ducts into the veins onwards through the pulmonary vessels, by the carotids to the cerebral vessels is a long, tedious, and circuitous route which needs much time and favouring conditions, because tubercle bacilli have no organs of locomotion of their own.

The extraordinary phenomena, that have been described under the name of "retrograde metastasis," prove that tubercle bacilli, once they have entered lymphatic vessels, may turn up and manifest their activities in many strange places. The transference of pigment coal or soot particles, and, as we know, of living germs of various kinds from the skin, from mucous membranes, from the lungs, and from lymphatic structures (vessels, etc.) proves most surely that, in spite of their being non-motile, germs of all kinds and sizes may reach any and every internal organ, provided they are small enough to pass through the capillary system of the pulmonary vessels.

The transference of most bacteria, such as streptococci, pneumococci, typhoid bacilli, anthrax bacilli, etc., is the more rapid because these bacilli increase and multiply as they spread into the tissues. The favourite method of

obtaining cultures of these organisms is to withdraw blood from the chambers of the heart in animals, and in man, too, this method is often successful. These bacteria, therefore, have been carried to the heart by the circulating blood, and may thence be carried rapidly into the vessels of the brain. But while it may take but a few hours for streptococci to induce acute, fatal septicæmia, tubercle bacilli act in a far more leisurely way and produce typical tubercles by a relatively slow process. The most rapid form of metastasis terminating in tuberculous meningitis may be imitated by the artificial injection of living, virulent tubercle bacilli into the veins of an animal. In these experiments, it is well known that for some weeks (6-10) there is little to indicate this artificial bacillæmia, and it is several months before the animal dies of acute general tuberculosis.

From these experiments upon animals, we have every right to assume that in man also, if generalization of tubercle bacilli has occurred by the blood vessels, symptoms related to the brain will not occur for at least several weeks after generalization. Thus, if symptoms indicating invasion of the brain appear within a fortnight of an injection of tuberculin, one is not justified in assuming that the supervention of the brain tuberculosis had anything to do with the previous injection of tuberculin. I emphasize this point, because in all my experience with injections of tuberculin, used in every stage of tuberculosis, and in the largest possible doses, I have had two instances of tuberculous meningitis occurring in association with tuberculin injections, but within such a short period of time after the dose that one must conclude that generalization leading to the lesions of the brain occurred weeks before any tuberculin had been given.

In one instance, only one dose of tuberculin had been given, amounting to about .0002 cc. P.T.O. In both cases, the symptoms developed a week after the dose was given, and the patient died—one a week and one a fortnight later. In one case, subsequent investigation disclosed the very important fact, that the patient had been much depressed, very irritable, and suffering from headache, and had had attacks of vomiting. In this case also, it is necessary to add, I had advised the patient three months before to submit to a course of tuberculin

treatment. He did not accept my advice, and became steadily worse. Because he was getting worse, he changed his mind, consulted me again, and decided to have treatment. Having examined him thoroughly on his first visit, I did not inquire specially into his state of health on his second visit. This I admit was a mistake. In order to lose no time, because the patient was manifestly worse, I gave him this single injection, and within a week the meningeal symptoms, which were threatening, became obvious. These details prove beyond a doubt to anyone conversant with the onset of generalization of tuberculosis, and the interval of time necessary for its development, that the small dose of tuberculin, which, in fact, had not raised the temperature to 100° , could have had nothing whatever to do with the meningeal symptoms.

In the second case also, the man looked extremely ill, was much depressed, and had but two small doses of tuberculin. In less than a fortnight, meningeal symptoms supervened, and death occurred shortly afterwards. I am, therefore, justified in concluding that in these particular cases the injections had not caused generalization of the disease. I must emphasize these facts, because my explanation would be endorsed by those who are competent to form a sound opinion—and if this be admitted, I am able to make the very striking assertion that, although I have used tuberculin in the largest possible doses in every stage and form of tuberculosis, I have not even one incident or accident to support the view that tuberculin causes mobilization of tubercle bacilli. In fact, my experience lends itself to the reasonable conclusion from very abundant evidence that tuberculin obviously diminishes the risk of mobilization, and thus reduces the risk of tuberculous meningitis.

But pulmonary tuberculosis has other inherent dangers of its own besides tuberculous meningitis. One of the most distressing for the patient is hæmorrhage. Hæmorrhage may be the first sign of the disease, but it may never occur at all. There may be one big hæmorrhage, and not another. There may be several hæmorrhages, one after the other, or at long intervals of time. As a rule, hæmorrhage is moderate in amount, at any rate several ounces; or there may be one severe hæmorrhage ending in death. Thus we learn, and it

is important to note, that hæmorrhage may occur at any stage of the disease, and varies infinitely in its frequency, character, and amount. Certainly hæmorrhage occurs in about one-third of all cases of tuberculosis of the lungs, some say in two-thirds, so that it is really very common.

Nevertheless, it is a striking fact that in 25 years' experience with tuberculin, chiefly administered ultimately in large doses, I have not had a single fatal case from hæmorrhage.* It is my custom to proceed boldly with tuberculin in cases of hæmorrhage not exceeding a few ounces in amount. I withhold tuberculin for a few days, not exceeding a week, unless the patient has been exhausted, or a mixed infection accompanies the hæmorrhage. Hæmorrhage may be the first sign of a mixed infection, and, as a tuberculous focus has broken down to cause the hæmorrhage, it may happen that by simple aspiration into different parts of the lung of infectious material, fresh and scattered foci of tuberculous broncho-pneumonia may supervene. To my mind, the effects of tuberculin in cases of hæmorrhage furnish incontrovertible evidence of the healing properties of tuberculin. It seems to be established clearly by post-mortem examinations and experiments upon animals, that tuberculin is the most powerful agent for determining fibrosis, and there is no other way of explaining the uniformly successful results of tuberculin treatment in cases of hæmorrhage, than by assuming the ready production of fibrosis in and around the tissues and vessels, once the hæmorrhage has arisen. Thus tuberculin arrests hæmorrhage.

Recently, a poor woman in a late stage of pregnancy came to the dispensary, giving a history of previous hæmorrhages, and while she was waiting in the waiting-room hæmorrhage came on and continued for some time. She must certainly have lost half a pint of blood. She had had no tuberculin. If she had had even one, or more doses, how easy to lay the blame on tuberculin! The patient was sent home in course of time, and within a week of the hæmorrhage tuberculin treatment was started. She has had tuberculin ever since, and so far there has been no return of the hæmorrhage. In pregnancy, when blood-pressure is usually high, the risk of

* Since this was written a case of death from hæmorrhage occurred in an advanced case long after treatment had ceased.

hæmorrhage is great, and must be anxious until some time after childbirth. Six months later, this woman had the appearance of perfect health, and has had no more hæmorrhages.

Pleurisy is a common incident in pulmonary tuberculosis, and far from tuberculin increasing its frequency, tuberculin treatment generally leads to the disappearance of the signs of pleurisy. It may be localized dry pleurisy, or effusion of fluid in various amounts may occur. So satisfactory has been the absorption of fluid, even though existing in considerable amounts, that I can hardly remember aspirating and withdrawing the fluid in the last twenty years. If there are signs and symptoms of positive intra-thoracic pressure, it may be wise to do so, but short of this severe condition I have found that tuberculin brings about absorption and disappearance of the signs and symptoms of the fluid. The most striking instance of absorption of fluid of this nature I observed in a case of tuberculous peritonitis.

The patient came into hospital for gastritis with vomiting, a foul tongue, and some slight fever. On examination, the liver was found to be enlarged, and there was fluid in the peritoneum. He reacted to the first dose of tuberculin, given when temperature was normal, to 103°. Under tuberculin treatment the fluid was absorbed, and in two months' time the patient insisted upon leaving the hospital, because he felt quite well and able to resume his duties. Within a few weeks, he returned to the hospital, and there was an enormous amount of fluid in the peritoneum, measuring gallons, because his weight increased by two or three stone from the simple accumulation of fluid. The abdominal distension was so great, that the veins on the surface were very prominent and enlarged. It was quite evident that he was suffering from tuberculous peritonitis of the moist variety. This diagnosis had been made, when he first came into the hospital. He was not tapped, but tuberculin treatment was continued, and in less than three months the abdomen resumed its normal character, and this enormous quantity of fluid was rapidly absorbed. The patient was unsatisfactory and addicted to drink. Again he insisted on going out, and a short time later entered another hospital at which laparotomy was performed. The man died the day after the operation. There is little doubt that tuberculous

peritonitis was complicating cirrhosis of the liver, but this patient illustrated in a very striking way the rapidity with which fluid accumulations may be absorbed under tuberculin treatment. In tuberculous peritonitis as in pleurisy, the disease may exist in a latent form.

The accidental discovery of fluid, or of the physical signs of dry pleurisy or peritonitis, may first call attention to the tuberculous process. Every clinician knows that pleurisy, with or without effusion, may produce no local symptoms. Painless pleurisy is pathognomonic of tuberculosis, and is such a common phenomenon in pulmonary tuberculosis that, unless one is on the alert, it may appear and extend without being suspected. Hence, unless constant examinations are being made for the purpose of detecting the presence or absence of pleurisy, any statistics with regard to the development of pleurisy during the progress of pulmonary tuberculosis may be quite untrustworthy.

Further, if a sceptic is using tuberculin in treatment, and is very much alive to the risk of pleurisy being excited by the remedy, frequent examinations may lead to the detection of pleurisy, which would otherwise have escaped notice. One must also observe that signs simulating pleurisy may arise in the lung tissue. We thus see how easily these physical signs may be interpreted to favour the particular view which obsesses our mind. One of the opponents, or, at least, doubtful advocates, of tuberculin (Dr. Bardswell) has written a book in which he tells us that pleurisy supervened in two cases out of 154 treated with tuberculin—about 1·4 per cent. This evidence in itself is the best answer to Dr. Bardswell's suggestion.

In Hamel's statistical compilations (*Tuberkulose Arbeiten*), we find that pleurisy occurred as an incident in 8·1 (4·7) per cent. of the cases, during the stay of the patients in the public sanatoria of Germany. The majority of patients remained in these sanatoria three months. At Midhurst, six months is the usual period. Thus, we see that pleurisy is a far more common incident in cases treated in sanatoria without tuberculin than in those treated with tuberculin. Most surely it is idle to argue that tuberculin may start pleurisy, when Dr. Bardswell shows us that this incidence of

pleurisy is less frequent in cases treated with tuberculin than in ordinary sanatorium cases.

Pneumothorax is a most dangerous incident in pulmonary tuberculosis, and is a rare accident except in this disease. My own experience tells me that tuberculin does not increase the risk of pneumothorax. On the contrary, the risk is diminished. Pneumothorax complicates 5 per cent. of fatal cases of pulmonary tuberculosis, and 80 per cent. of the cases of pneumothorax are fatal when no tuberculin has been used. Usually it occurs in the later stages, but it may be early, and occasionally is the first serious condition to attract attention to disease of the lungs. Since it is a well-recognized and fairly frequent complication of pulmonary tuberculosis, I must protest against the assumption of Dr. Bardswell that, because in one case, out of 154 cases treated by him with tuberculin, pneumothorax occurred, the tuberculin treatment was responsible for the incident. The rarity of this occurrence in his 154 cases would imply rather that tuberculin tended to diminish the frequency of pneumothorax. In all my experience with tuberculin, used in large doses in every stage of the disease, I have seen but two cases in which pneumothorax occurred.

In one case, the patient was a woman who made very rapid and marked progress until this accident supervened, and ended fatally. In the other case, a medical man, I had made a note ("signs of very superficial small cavity"), pneumothorax occurred, and its occurrence was well explained by the physical signs noted before the accident. In this case, the pneumothorax disappeared.

In the far fewer cases coming under my notice which received no tuberculin treatment, there were also two cases of pneumothorax. One of these died within a fortnight; the other I treated at once with tuberculin, and he made a perfect recovery.

Whatever others may think or argue, my experience is quite incompatible with the view that tuberculin injections may cause pneumothorax. If this were true, pneumothorax should have occurred more often than twice in an experience dealing with nearly 1,000 cases in every stage of the disease. This view is strengthened by the fact, that the only case of pneumothorax treated with tuberculin made a perfect recovery.

In the case recorded by Dr. Bardswell, the pneumothorax

occurred six days after the dose was given; by that time the maximum effect of the dose was long past. Those familiar with the temperature curves of a tuberculin reaction would say at once, that in this instance there was no evidence of a typical tuberculin reaction, and that the occurrence of pneumothorax was an incident quite independent of the dose of tuberculin. In more than 20 years' experience with tuberculin in at least 1,000 cases, I have only had one fatal case of pneumothorax. The statistics of any sanatoria show that pneumothorax was no uncommon complication of pulmonary tuberculosis before tuberculin was discovered, and was far more common than my own statistics show.

Lastly, there are those who think that tuberculosis of the larynx may be excited by tuberculin, and Dr. Bardswell implies that this may happen even when tuberculin has apparently benefited the patient. He cites in his book, on page 59, case 20, in which there was "a development of tuberculosis of the larynx during a course of apparently successful tuberculin treatment." Yet on admission, Sir StClair Thompson recorded as follows: "Suspicious deposit in left ventricular band and in front of the right arytenoid." A course of tuberculin was given. Two months later, Sir StClair Thompson describes the larynx as normal, and T.B. were no longer present at the end of sixteen weeks. Unfortunately, tuberculin was given in such small doses (largest dose .2 cc. T.A.F.) that only a transient improvement would be expected. This improvement occurred. Now, see the result of timidity. Subsequently, Sir StClair Thompson found "a definite, small, ulcerated spot over the right arytenoid cartilage." Foolishly, tuberculin was discontinued. "Six months later the laryngeal lesion was still present, though much reduced. The lung disease remained unaffected throughout."

On the strength of great experience in these very cases, I have little doubt that if the tuberculin treatment had been continued, the ulcer in the larynx would have entirely healed, and in support of this I could furnish before a commission of experts the most conclusive evidence. I should much like to know the subsequent history of this case, but unfortunately Dr. Bardswell's experience with tuberculin is of such recent date that there has not been

time for these after-examinations. I repeat now, as I have frequently said before, that incomplete records cannot help us in forming our opinion upon the value or the dangers arising from the use of tuberculin.

Further, Hamel's sanatorium statistics show that laryngeal tuberculosis supervened as a complication in 3·1 (2·1) per cent. of the cases, while they were still under treatment. Dr. Bardswell, on the other hand, records two cases out of 154 in which this laryngeal complication supervened.

I have seen two instances in which laryngeal tuberculosis appeared during a course of tuberculin treatment. In one case (Stage II.), an ulcer formed between the arytenoids, and spread till it was a centimetre, or larger, in diameter and circular. I continued treatment, and the ulcer healed absolutely, leaving a smooth surface without a trace of its previous existence. In another case (Stage III.), of several years' duration, with a large cavity at the right apex, marked failure of health, loss of three stone, a nasty ragged ulcer appeared at the junction of the arytenoid and the vocal chord, causing loss of voice. Lactic acid had no effect, but rather appeared to make it worse. I therefore abandoned it, and persisted with tuberculin. In both of these cases the ulcers completely healed, the voice was restored, and in the first case, eight years afterwards, there was no return; in the second case, six years afterwards, there was no return of laryngeal trouble, and the man was in splendid health, without any cough, and had been for several years at work in a newspaper office. He gained 42 lbs. during treatment.

Thus, I have some reason for thinking that with a little courage, Dr. Bardswell might also have cured his case of laryngeal tuberculosis with proper doses of tuberculin. I can say also that in no other case, out of several hundred reported in my book, did laryngeal tuberculosis arise during the use of tuberculin.

These results also show the value of tuberculin even in advanced cases of the disease.

In some unaccountable way, Professor Karl Pearson and Dr. Bardswell have misread my work and the work of Bandelier and Röpke, since they declare that "the chief supporters of tuberculin hardly assert that it produces much

favorable effect in this class of case" (group 3. See Prefatory Note, Bardswell's Report, p. 10). An explanation may be that they have read an old edition of Bandelier and Röpke, because in the latest edition it is stated most positively that great benefit accrues to these late cases from tuberculin treatment, and tuberculin is specially recommended for them.

Anyone at all conversant with the modern methods of using tuberculin, advocated not only by myself, but by Bandelier and Röpke, Moeller, and many others, must recognize at once that in Dr. Bardswell's hands tuberculin has really had no trial at all. In the first place, with few exceptions, the doses have not been large enough to produce any satisfactory effect. Secondly, the timidity arising from a mistaken view of the meaning and effect of a temporary reaction, or slight rise of temperature, has tied his hands; and, thirdly, he has attempted to form an opinion on the value of tuberculin after little more than two years' experience.

The chief dangers inherent in the disease itself are hæmorrhage, pleurisy, pneumothorax, mixed infections, and metastasis. A careful comparison of the incidence of these dangers in cases treated with tuberculin and those treated by other methods, including sanatorium methods, will show that these dangers, instead of being increased, are actually diminished by the skilful use of tuberculin as a remedy. There is still one potential danger to be discussed, which, if it be an actual risk, can only arise if tuberculin is given—the danger engendered by reactions to tuberculin.

I am not one of those who think that a reaction is a serious danger, unless it is so severe or so often repeated from the injudicious use of the remedy that the vitality of tissue cells is depressed or damaged. So often patients, who are fair judges in the matter, voluntarily tell us that they feel much more benefit after a reaction than without one, and this subjective experience is borne out by a higher standard of tissue metabolism, and by the significant objective phenomena, such as gaining weight, diminished loss of nitrogen and phosphorus by the excreta, and especially by a striking renewal and reinforcement of energy, that *primâ facie*, one would argue that reactions, though not necessary, might some-

times be desirable.

In support of this view, I have observed that in definite cases of pulmonary tuberculosis with tubercle bacilli in the sputum, a complete absence of reactions may sometimes occur, and in my experience the ultimate issue is by no means so satisfactory as in cases in which reactions have been frequent and are almost inevitable.

REACTIONS.

More than 15 years ago, I abandoned all hope of obtaining successes by means of small doses of tuberculin, because they rarely yield anything better than mere transient improvements, and in order to disassociate the idea of danger and the occurrence of reactions, we must carefully consider the radical error of misinterpreting the action of tuberculin, and the *raison d'être* of its use.

In specific infectious diseases, the disease itself leads to a profound disturbance of metabolism, the acuteness and severity of which vary. A very good index of this disturbance is the degree and duration of the fever, which is a common accompaniment of these tissue changes. In diseases such as cholera, tetanus, diphtheria there may be profound intoxication, causing collapse from failure of the circulatory and respiratory systems. But in typhoid fever, pneumonia, puerperal fever, and other septic conditions, there is fever which is an index to the severity of the attack. Cure of the disease is brought about by these tissue changes, which create an abundant supply of specific substances called anti-bodies, and thereby confer immunity against further attacks. In most of these diseases, fever is an invariable accompaniment of these tissue changes, and it is conceivable that without this fever the production of these anti-bodies might either fail or be insufficient to produce this immunity.

There is reason for believing that the highest degree of immunity is secured by a severe attack. Thus, a mild attack of modified small-pox (vaccinia) does not confer the same degree of protection as a real attack of small-pox. The fever, too, is an accurate index of the severity of the attack. Conversely, one may argue that weak doses of tuberculin without definite reactions in the form of fever, may not

induce any useful degree of immunity, while large doses with many reactions may establish a high degree of immunity. In the latter instance, the typical course of the disease is approximately imitated.

A priori, therefore, one would expect the method which induces a certain degree of fever to be the sounder in principle for establishing effective immunity. The most effective form of immunity known is that produced by an attack of the disease, and fever is an invariable accompaniment. *Fever, therefore, does not interfere with the production of almost absolute immunity*, and, on grounds of analogy, I should prefer to work out immunity by way of reactions accompanied by fever, especially when actual observation appears to support this method of procedure.

There can be but one argument against this method—the argument of danger. With increasing experience, I became more and more convinced that there is very little logical evidence in favour of the view that a reaction, such as occurs after a moderately increased dose of tuberculin, carries with it an appreciable danger. If any such danger existed, we should have had clear and abundant evidence in an experience extending over 25 years, during which large doses of tuberculin have been administered in many hundreds of cases, in all forms and in all stages of tuberculosis. Our experience, on the contrary, seems to teach, definitely and positively, that reactions accompanied by temperatures of 101° , 102° , 103° , and I might say of even 105° and 106° , do not cause anything else than a transient disturbance, and frequently a week or a fortnight after these violent reactions the patients have voluntarily stated that they have felt better than they were before the reaction occurred.

I would certainly avoid, or try to avoid, reactions above 102° or 103° , but in my book, "Tuberculin in the Diagnosis and Treatment of Tuberculosis," on p. 227, I have given instances of numbers of cases in which marked improvement followed upon the bold use of large and increased doses in spite of reactions. I am generally less hopeful of a satisfactory result if, during treatment, there is a marked absence of reactions.

It has happened, fortunately not often, that by accident a wrong dose has been given, sometimes 10 to 20, or even 50 times as strong as the dose intended, and yet in not one of these cases has any serious result followed. In not one

instance was there any sign of exacerbation of the disease, nor was there any permanent or injurious deterioration of health. Paradoxical as it may seem, even the temperature in these cases has not been extraordinarily high.

The most severe reaction I have ever seen was in an advanced case of pulmonary tuberculosis, complicated with laryngeal tuberculosis, in which there had been complete and permanent cure of the laryngeal ulceration and extensive fibrosis in the lungs. Several years later, a tuberculous mass formed in one of the chondro-costal articulations, and there was recrudescence of the lung disease. The patient was in a parlous state, and with her consent I determined to try intravenous injections of tuberculin, using T.O., which contains pyrogenic substances. I proceeded carefully up to .2 cc. without any marked reactions. I then increased the dose further, and the injection was followed by a rise of temperature to 105° , which continued with slight remissions for two or three days and then returned to the normal by lysis. During this attack, the patient was delirious and violent. In a few days, this nervous disturbance completely disappeared.

One can only speculate upon the nature of this severe reaction. It cannot have been due to any metastasis, because recovery from this severe condition was complete and permanent. Nor is there any reason to think that the toxins injected had any special effect upon brain cells and tissues. It would be a mere speculation to suppose that there was already a focus of tuberculous disease with tubercle bacilli in some part of the brain. In such a case this severe, nervous derangement of function might have been due to a definite inflammatory exacerbation in this hypothetical tuberculous focus—in fact, to a definite focal reaction in the brain. If this were true, the subsequent disappearance of symptoms and complete freedom from any further nervous symptoms favour the view that this dose, while it induced a severe focal reaction, did not awaken fresh activity in this tuberculous focus, but may have even prevented its further development.

The tuberculin reaction is a very characteristic phenomenon, varying in character with the amount of the dose and the condition of the tuberculous lesion, the effect of the previous dose, and the interval of time after the previous dose ; although

the intensity of the reaction varies widely, its chief characteristic remains the same.

The rise of temperature is the simplest index of the intensity. In *mild* reactions, the temperature rises to $100^{\circ}\cdot5$ – 101° . In these cases, there is drowsiness, headache, malaise, loss of appetite, lasting only a few hours, while the temperature persists. The temperature then falls to normal, or below, and may rise slowly again to $99^{\circ}\cdot2$ – $99^{\circ}\cdot5$. In a day or two, recovery is complete, and often the patient feels better. The immediate effect of the dose is to cause a slight loss of weight— $\frac{1}{2}$ lb. to 1 lb.—but this loss is soon restored, and in six to seven days the weight may be above that before the dose was given. In *moderate* reactions the temperature rises to 102° – 103° . It usually lasts longer—twelve to twenty-four hours—and then falls, sometimes rapidly, sometimes more slowly, to normal; in twenty-four hours or more it may rise to $99^{\circ}\cdot5$ or 100° , but again returns to the normal and remains there.

The local reaction at site of injection is more severe; gradually, a form of infiltration occurs around the site of injection and spreads. It may spread, accompanied by a more or less extensive zone of hyperæmia, which disappears soon. The infiltration increases, and may persist for several days. Occasionally, too, a small hard mass like a fibrous nodule may form and remain for several weeks. Sometimes there is also a focal reaction with definite symptoms, especially pain or discomfort related to the tuberculous lesion itself. Complete resolution at the site of injection always occurs.

The *most severe* reactions occur when the injection by accident is made into a vein. Then there is usually no reaction at the site of inoculation, and the temperature begins to rise two or three hours after the injection, rising rapidly to 103° , 104° , or 105° . It may continue for twenty-four hours or more, and the symptoms are severe. Very often there is a definite rigor, or at least severe shivering. Herpes is also common. The general symptoms are severe: persistent headache, nausea and even vomiting, lightheadedness, and possibly delirium. Sleep is broken, and the patient is exhausted.

These symptoms are never dangerous. The temperature may last forty-eight hours, and then falls rapidly, but there is a subsequent rise of temperature to 100° before it returns to the

normal. With this severe fever, albuminuria is not uncommon. An equally severe reaction may occur after an excessive dose given subcutaneously, but in this case there is great infiltration at the site of the injection, both intense and extensive, and vesiculation is common, either in the form of small, clear vesicles, or in the form of one large blister, which may be half an inch or an inch in diameter.

These reactions are sometimes very capricious, especially during the administration of small doses in sensitive individuals. Idiosyncrasy plays an important part in this early stage, and may be encouraged by spacing out the doses too much. Thus, it is possible to establish an abnormal sensitiveness to tuberculin by merely giving doses at too long intervals. It will be remembered that Wright recommends the dose of tuberculin should be given every ten days or a fortnight. That is a very successful way of bringing about hypersensitiveness. On the other hand, if doses are given at intervals of not more than five or six days, this hypersensitiveness disappears. It is very remarkable that a dose of .001 cc. Old T. will only produce a temperature of 100° , while if a smaller dose of P.T.O., a much weaker preparation, is given, the temperature may rise to 101° , 102° , even 103° , and this sensitiveness may show itself after every injection for several weeks (*see charts*).

Chart 2. CASE Mr. L.—Is extremely interesting as the most sensitive case in my experience. History: January and July, 1909, pleurisy with effusion left side; March, 1911, symptoms of influenza. T. B. found, tuberculosis developed in testis. Then given I. F. 1911-12. Enlargement of cervical glands, first on left side, then also right, down to clavicles. Very large. 1914. Further trouble in testis. Came to me April, 1915. Since treatment, in spite of reactions, frequent and severe, gained 4 lbs. Cervical glands greatly reduced in size. Pain in testis practically ceased, and patient able to walk about without discomfort.

Surely this proves that tuberculosis, in spite of reactions, even when tuberculosis is general, in lungs, in glands, and in genito-urinary tract, may greatly benefit patient.

Temperature has, besides, returned to normal limits. Originally evening temperature 100° , 101° , and for several days between $99^{\circ} \cdot 6$ to $99^{\circ} \cdot 8$.

Now in studying the effect of tuberculosis, one must have had a considerable experience in the use of tuberculin in order to recognize at once these capricious forms of oversensitiveness. They suggest anaphylaxis, but are probably essentially different. Firstly, the symptoms do not develop

suddenly with profound disturbances, and the chief symptom

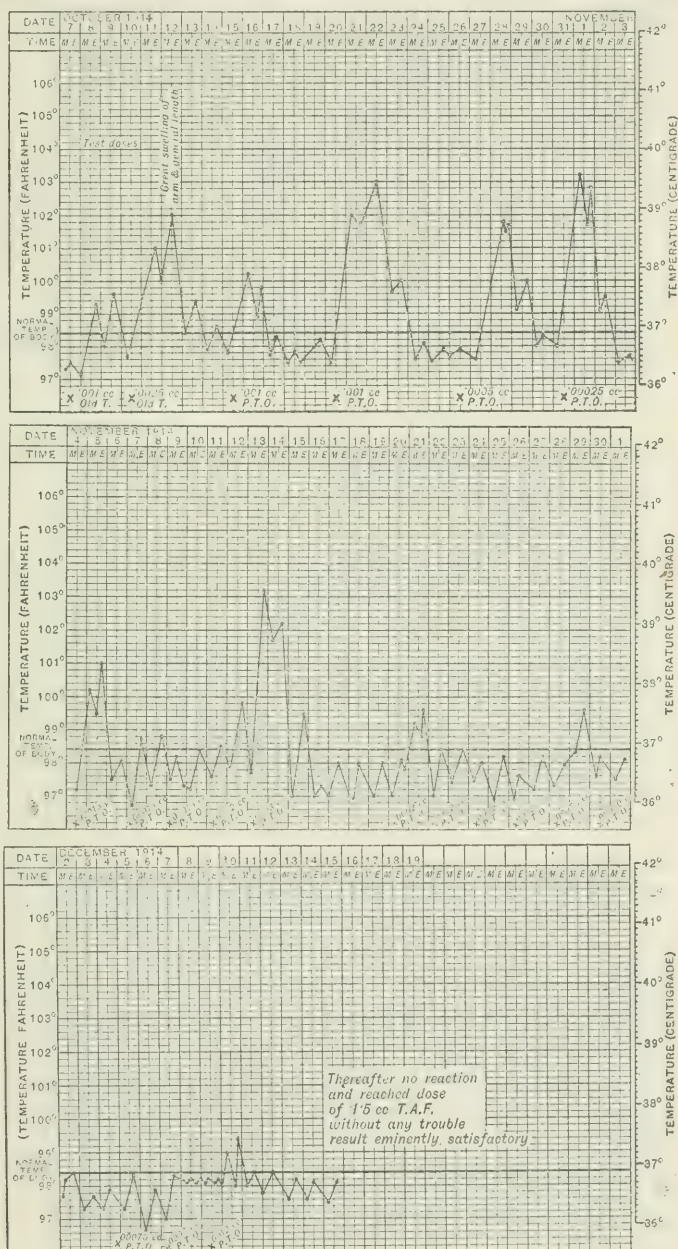


Chart 1.

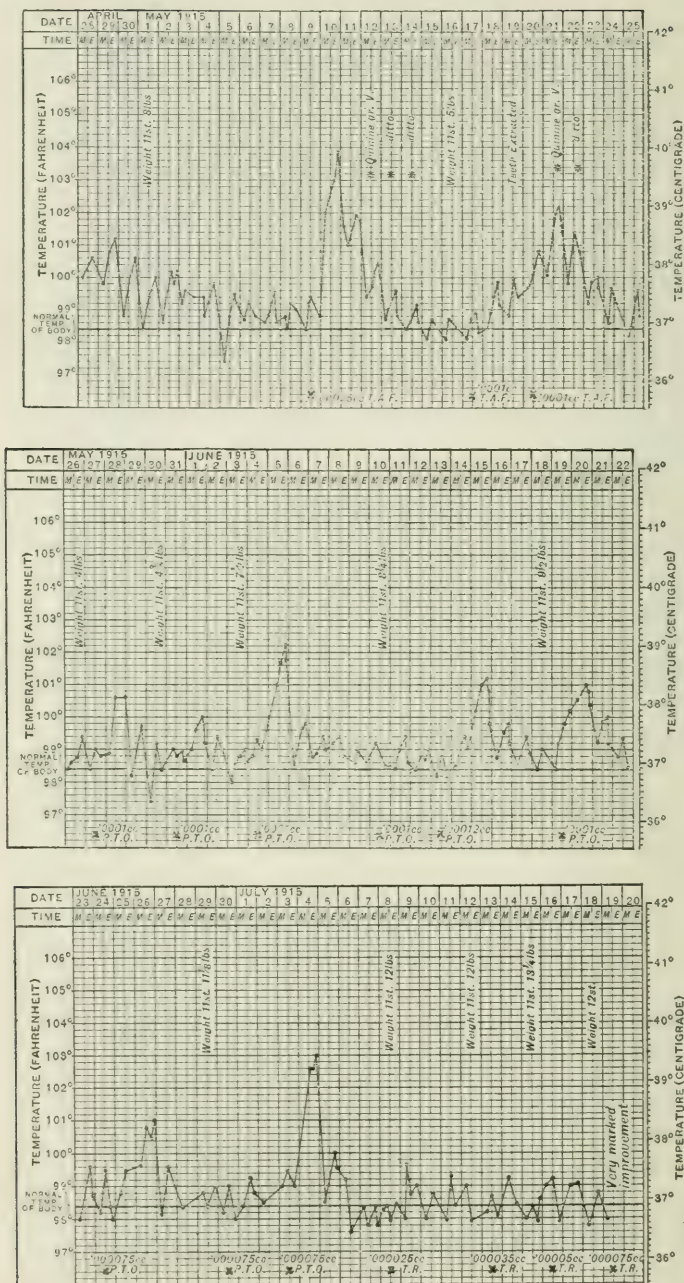


Chart 2.

may be fever. Further, they appear even when a dose is given five or six days after a previous dose. Once the anaphylactic shock is over, there is no further effect. After a tuberculin reaction, there is a marked metabolic disturbance. In anaphylaxis, there must be an interval of at least 10 days before the anaphylactic shock can manifest itself. The reaction and rise of temperature after tuberculin recur with each dose for several weeks, in all these points contrasting essentially with true anaphylaxis. Anaphylaxis is not accompanied by fever, the symptoms are very sudden, and may be dangerous, but recovery is very rapid and there are no after-effects, such as loss of weight. With oversensitiveness, the rise of temperature is more gradual, needing time, and is always followed by loss of weight. It occurs to me that, possibly when very small doses are given, especially at long intervals of time, this hypersensitiveness may arise and be the source of some of the troubles met with by those who advocate the use of very small doses. I have never used these small doses, but those who have done so report marked rise of temperature with doses, which are at least one hundred times smaller than the dose I begin with.*

I have found that sometimes, in these conditions of oversensitiveness, the *injectio vacua* may cause the temperature to rise to 101° or even higher. Erratic and intercurrent febrile disturbances may be due to various things—digestive disturbances, pyorrhœa, and other unhealthy conditions of the mouth.

A very frequent source of fallacy arises from the confusion of a typical tuberculin reaction, accompanied by rise of temperature, with rises of temperature of other origin. In pulmonary tuberculosis, the course of the disease is prolonged, and irregular attacks of fever are common and arise from many causes. The tuberculous process itself may be responsible for the moderate or small degree of fever, and even in rare cases high fever may occur in the acute and rapidly progressive forms of the disease. But in these acute forms, with temperatures 101° , 102° , 103° , and 104° for days and weeks, with remissions, there is almost always a mixed infection of an

* "I have at last met with a case of oversensitiveness which baffles description or explanation" (see Chart 2).

influenzal, pneumococcal, or streptococcal origin. These forms can readily be differentiated by proper bacteriological analysis of the sputum. Still, a very small number of cases appear not to be associated with these infections, and we are driven to the conclusion either that the tuberculous process itself may cause in man, as it does in animals (bovines), a severe form of fever, or there are associated with the tubercle bacillus specific organisms that have not yet been identified.

Another frequent cause of rise of temperature is intercurrent pleurisy, which may be pure tuberculosis of the pleura or due to secondary infection. In these acute forms, the fever lasts several days and may last weeks, even many weeks. These attacks of fever may occur at any time and in any form of tuberculosis, early or late. Accordingly, if tuberculin is being administered every three or four days, it is evident that the rise of temperature must occur after one or other dose of tuberculin, and one's first impulse would be to associate it with the dose of tuberculin. In order to save oneself from this fallacy, one must have a very definite conception of the character of a tuberculin reaction with fever, as distinct from the course and currency of the fever associated with these common intercurrent incidents causing fever of their own, and the frequency of such intercurrent attacks apart from tuberculin treatment. Only thus, and after careful weighing of the evidence of this nature, is it possible to avoid the altogether too frequent error of confusing the *post* and *propter hoc*.

One of the commonest errors committed by certain critics of tuberculin is the calm assumption that any rise of temperature after a dose of tuberculin is a reaction. I must protest strongly against the assumption, that a rise of temperature is necessarily a reaction. It may be nothing of the sort. Irregular febrile disturbances are common incidents in the course of an active form of pulmonary tuberculosis. These febrile attacks vary much in intensity, duration, and nature. They may be quite independent of the tuberculosis, or be directly due to it. Pyorrhœa, constipation, indigestion may disturb thermotaxis or increase thermogenesis, and even the failure of proper thermolysis may in various ways cause a rise of temperature. Extensive muscular exer-

cise, especially in untrained persons, may raise the temperature. One knows that in tuberculosis there is a proneness to sweating, especially at night time. Even in the day, sweat may trickle down from the axilla. This sweating favours discharge of heat, and thereby the temperature may be temporarily depressed. In nervous people, too, there may be a tendency to irregular risings and fallings of temperature, even without any increased tissue metabolism, probably nervous in their origin and nature.

But apart from these casual and transitory fluctuations, fever may be an effect of the definite pyrogenic toxins of various organisms, pathogenic, and perhaps in some cases non-pathogenic. Tuberculosis in no way confers immunity against other infections, and influenza bacilli, streptococci, pneumococci, staphylococci, and perhaps other organisms are more likely to find a suitable nidus in the damaged wall of the air-passages in pulmonary tuberculosis than in the healthy air-passages. These feverish attacks are common enough in healthy persons in the form of catarrhs, bronchial catarrhs, and even broncho-pneumonia, and are likely to be more frequent in those suffering from pulmonary tuberculosis than in others.

Their characters must be studied in otherwise healthy persons, so that when they occur in those affected with pulmonary tuberculosis, the real nature of the complication may at once be recognized. Temperatures of 100° , 101° , even 102° , running an irregular course for a few days or longer, may be due to the organisms, causally related to mild, moderate, and severe attacks of rhinitis, pharyngitis, laryngitis, bronchitis. If these secondary infections then arise, as they will in cases that are being treated with tuberculin, they may be ascribed to the action of the tuberculin for no better reason than that the observer has not the knowledge or experience to differentiate these feverish attacks from a tuberculin reaction. Yet, with care and some pains, especially by means of plate cultures in these conditions, it is quite a simple matter to demonstrate the intrusion of a fresh variety of organism into the air passages. But until this method of controlling the true nature of these intercurrent and secondary infections in pulmonary tuberculosis is systematically exploited, this otherwise obvious source of error cannot be eliminated, and we shall have mistakes in

diagnosis.

Secondary infections may be of transient duration; they may bring about the more serious condition of a mixed infection in the tuberculous focus; then the whole clinical picture of the disease becomes profoundly changed, and persistent fever, wasting, sweating become the striking symptoms which may presage a fatal termination. In these cases, the direct cause of death is exhaustion, caused by the mixed infection, and the tubercle bacillus is the least important factor in causing death. Nevertheless, there is a vicious circle in this morbid process. The tubercle bacillus has created a suitable nidus for the growth and multiplication of the secondary organisms, and these various organisms, by inducing active, inflammatory changes with more or less suppuration, lower the vitality and resistance of tissue, and favour thus the activity and extension of the tuberculous process.

In these days of modern methods, the absence of a scientific analysis of the sputum, for the definite purpose of determining the nature of the mixed infection, is not worthy of any institution, which has the reputation of being specially devoted to the scientific study of pulmonary tuberculosis and the best way of treating it. Until special methods are systematically applied to all cases in which incidental fever arises in the course of pulmonary tuberculosis, the real nature and origin of these feverish attacks will be ignored, and should such fever rise during the administration of tuberculin, the physician of limited vision cannot escape serious mistakes in the diagnosis of the true cause of such fever; nor will it be possible to discriminate between the effects of a fresh infection and the effect of a dose of tuberculin.

Anyone who takes the trouble to investigate carefully and without prejudice tuberculin reactions will find, as I have already said, that they have a character of their own, which is not easily mistaken for any other rise of temperature.

It is quite plain, too, that the men, who have the fewest opportunities of examining these temperature curves of a tuberculin reaction, are those who believe in the reactionless method, and these are the very men who protest too much concerning the frequency of irregular and even prolonged attacks of fever after a dose of tuberculin has been given.

Those men, then, who use very small doses have no means of knowing what a typical tuberculin reaction is, and they have a fatal tendency to attribute accidental rises of temperature of various origins to the antecedent dose of tuberculin.

Many are afraid of reactions, and, disregarding logical rules, set down every abnormal condition of temperature to tuberculin, although every man who has had experience in a sanatorium must know that these disturbances of temperature are very common from various causes, even when no tuberculin at all has been administered. I repeat it again, because the medical profession has been slow to recognize the truth, that secondary infections are very common incidents in pulmonary tuberculosis, especially in cities, and until their rôle is duly recognized, prejudice will dictate the fallacy of attributing effects to coincident events, because one has not enough knowledge or training to discover the real cause that lies just beyond his limited range of vision.

One observes that this doctrine is beginning to insinuate itself into the records of Midhurst, because we read on page 43* that one of Dr. Bardswell's colleagues does not agree with him in attributing the rise of temperature in Case 13, that occurred suddenly five days after a dose of tuberculin, to the tuberculin. Unfortunately, for no examination of the sputum or of the blood was made during the currency of this acute attack, the true cause of the fever was not discovered, or even sought for. When acute extension of the disease in the form of broncho-pneumonia develops, it is recognized that, in the great majority of cases, streptococcal, pneumococcal, or even influenzal infection has supervened. To the eye of an expert, the acute and sudden rise of temperature to 105° in the course of 24 hours, probably with a rigor, is totally unlike the effect of tubercle bacilli acting alone, and the subsequent course of the fever is just that of an acute streptococcal or pneumococcal infection. In this case, a fine opportunity of unravelling the nature of this fever was lost, and in the absence of this examination, which should be a matter of routine in such cases, it is the merest presumption to lay the blame upon tuberculin.

If the records of the institution were studied, many would be found illustrating the occurrence of irregular fever

* Dr. Bardswell's Preliminary Report.

in pulmonary tuberculosis, when no tuberculin had been used. If tuberculin had been given in these cases, the fever would have been traced causally to the tuberculin, although the tuberculin had had nothing to do with it.

The supremely important questions, which I have raised in this brief summary of my general conclusions regarding the effects of tuberculin used as a remedy in tuberculosis, especially pulmonary tuberculosis, need the closest and most conscientious consideration, because already it has become evident that neither sanatorium measures, nor tuberculosis dispensaries for the prevention of tuberculosis, offer a satisfactory solution of the problem of treatment.

I am firmly convinced, by evidence furnished during a five years' trial of tuberculin at a properly organized tuberculin dispensary, that these institutions are eminently worthy of the support both of the profession and of the laity.

The questions I have raised can only be answered by the evidence of facts, and it is not always easy to view facts in proper, logical sequence and relation.

The great question which I am ready to discuss and defend before any competent tribunal is that, in the hands of experts, tuberculin is not only free from the dangers which have been associated too lightly and erroneously with its administration, but is at once a valuable aid in diagnosis and an invaluable and indispensable remedy in treatment. I do not contend that it is the *ne plus ultra*, but the irresistible evidence of an experience extending over five years in hundreds of cases of tuberculosis of all forms and in all stages, leaves not the smallest doubt in my own mind that an independent and impartial inquiry would disabuse the medical mind of the imaginary evils alleged to arise from its use. Such an inquiry would, in my opinion, dispel many of the errors still hindering a solution of a difficult problem, which has not yet been approached and analysed in accordance with the rules of logic and science, and would be the first step towards the general exploitation of tuberculin as a valuable diagnostic agent in doubtful cases of tuberculosis, and as an invaluable remedy in a disease which is so widespread and so difficult to treat with success that no useful remedy should be left untried.

EMETINE HYDROCHLORIDE.

ITS USE IN MUCOUS COLITIS, DYSMENORRHOEA, PHTHISIS, AND
INTESTINAL HÆMORRHAGE.

By W. BERESFORD ROBINSON, M.B., B.S., M.R.C.S., ETC.

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EMETINE hydrochloride has been the source of much experimental work, since the discovery of its immense value in amoebic dysentery. Unfortunately, it does not seem of any value in cholera, but after using it for some time I am convinced that it has a very useful place in everyday medicine. My attention was first drawn to the drug in the "Practical Notes" of THE PRACTITIONER about 18 months ago, which—quoting from a French journal—stated that good results had been obtained from its exhibition in phthisis and gastric ulcer.

Except for its trial in cholera, I have seen practically no further mention of the drug and its use in medical papers of late, and my intention in writing this is to give my experiences up to now, and to ask others, who see more of the cases in question than I am able to do in general practice, to give emetine a trial.

Experimentally, emetine was found to have no effect whatever on blood-pressure, and neither vaso-constrictor nor the reverse effect on the vessels. Moreover, it did not seem to hasten the clotting of blood. So the laboratory has not as yet contributed much to our knowledge of the why and wherefore of its action. In amoebic dysentery, it seems to have a similar specific effect on the amœbæ to that of salvarsan on the organism of Yaws.

Emetine may be obtained either in the tablet form or in sterile solution in ampoules, etc. I find the latter form much more convenient, for the solid dissolves but slowly in water, and wastes some time at the bedside. The tablets are usually put up in $\frac{1}{2}$ or $\frac{1}{3}$ grain doses, and the ampoules contain $\frac{1}{3}$ grain. The dose usually stated is $\frac{1}{3}$ or $\frac{1}{2}$ grain, but I find this

on the small side and get much better results, without the slightest ill effects, from $\frac{2}{3}$ –1 grain.

The sole drawback to its use is that, even with the strictest aseptic precautions, there is a moderate amount of local tenderness after subcutaneous or intra-muscular injection. The drug must be given hypodermically. If given by mouth, it causes vomiting; I once tried it *per rectum*, but found that it produced tenesmus and diarrhœa. Still, the local reaction on injections is not sufficiently painful to preclude its use daily over long periods, if one varies the position on the arms and uses alternate arms each day. In one case I have given injections very frequently for months. There is no depressant effect, and the pulse I find—especially in one case, in which it was over 120 usually—is slowed and strengthened.

I have used it principally in four classes of cases:—(1) phthisis; (2) gastric ulcer; (3) mucous colitis and hæmorrhage; and (4) dysmenorrhœa.

1. *Phthisis*.—I have tried emetine in several cases of phthisis to check hæmorrhage in varying degrees of severity. In mild cases, I give it in $\frac{2}{3}$ grain doses daily, till about five days after the least suspicion of colour has appeared in the sputum. In these cases, it has been uniformly successful in checking the hæmorrhage in about three days.

The most severe case of phthisis I have tried it in was that of a pale thin man, aged 30, who, previously quite well, developed extensive phthisis with appalling rapidity, and in ten days from the first onset (to his notice) became utterly prostrate, with signs over most of both lungs and severe and copious hæmorrhage and very poor reaction. Calcium, morphia, amyl nitrite, etc., were tried with no effect, but soon after using emetine the hæmorrhage was checked. I had used the drug very little then, and wished to avoid over-dosage, so I only gave $\frac{1}{3}$ grain daily for three days, and then on the fifth day, as the hæmorrhage had entirely stopped, I desisted from using it. The hæmorrhage recurred very severely on the seventh day, and I repeated the treatment, using morphia as well to obtain quiet. On the seventh day, again the hæmorrhage recurred, and then I decided to increase the dose and lengthen the course of injections. I gave them daily for a week, on alternate days the second

week, and occasionally the following fortnight. There was no more hæmorrhage and the patient steadily improved, and five weeks later went to a sanatorium where they thought very gravely of him. I heard from him to-day—three months since he left my care—and he says that he has made immense improvement. In this case, the patient reacted very badly, and made no attempt at satisfactory fibrosis of the lung, but I feel that had it not been for the emetine, he would have died in a very few weeks. In future, in such cases, I intend to give a whole grain daily for at least ten days after the last signs of hæmorrhage.

Another case of hæmoptysis was treated without emetine, and all hæmorrhage disappeared in about twelve days, and she was allowed up in a month. The phthisis was of many years' duration. Hæmorrhage recurred a week after getting up, and I gave the patient $\frac{1}{2}$ grain emetine, and did not put her to bed at all in order to try the respective methods of treatment. There was no more hæmorrhage, and I only continued the injections for a week.

Since writing the above, I have had another severe case of hæmoptysis in a gentleman 60 years of age. He brought up about a pint of blood one evening; I saw him an hour after it started, and gave him $\frac{1}{2}$ a grain of emetine. The hæmorrhage stopped within four hours, and there has been none whatever since. He is making excellent progress, and had emetine daily— $\frac{1}{2}$ grain for five days and $\frac{1}{3}$ grain for the next few days, and then occasionally. In a fortnight he was about again. I did not use very large doses in this case, as the patient had much fibrosis of the lung, and had previously kept very well, though he had had phthisis for over 25 years. I find that a smaller dose is required in those cases in which there is fibrosis. After the first week Tr. Bellad. (mxii.) was given in a mixture with oxymel three times a day, and the râles very soon disappeared, though they were to be heard all over the chest after the hæmoptysis.

2. *Gastric Ulcer*.—Very little need be said of the use of emetine—combined with the usual dietary and medicinal measures—in this disease. By using it daily in $\frac{2}{3}$ grain doses, I find that the hæmorrhage rapidly ceases, and the recovery is decidedly hastened, but I have not been able to treat a sufficient number of cases to give any results in detail.

3. *Mucous Colitis and Hæmorrhage*.—About a year ago, I took over the treatment of a very severe case of mucous colitis. The illness first began in a mild form two years before, and after some months' treatment, during which time she was seen in consultation by a very eminent consultant, she improved sufficiently to get about, and tried to resume light work. Two months later, she had relapsed severely. Mucus was passed frequently, mixed with blood. She had great abdominal pain, severe headaches, and, during her menstrual periods, was in agony which morphia relieved very little. Tannigen only aggravated the colitis, and every ordinary drug was tried. Pyramidon alone relieved her headaches, but unfortunately supplies of this drug almost ceased after the outbreak of war. The pulse was feeble and about 120, and the patient was quite confined to bed and utterly prostrated. The least exertion led to fainting attacks, and she went from bad to worse. In December, I decided to give emetine a trial, and began with $\frac{1}{2}$ grain doses daily. In a week, all hæmorrhage had stopped, and there was less mucus than at any time during the whole illness. The pulse improved in strength and volume, and the pain was greatly lessened. The following menstrual periods were practically painless, even though the patient had always suffered severely at this time when well.

In six weeks, she was able to walk a little, and could enjoy a drive. Unfortunately, she caught influenza then, during a severe epidemic, and was very ill for two weeks, so that her progress was curtailed. I resumed the injections as soon as she improved a little, but the heart had been greatly weakened, and progress was again slow as regards regaining strength, though the mucus was quite checked, and there was no hæmorrhage. After the influenza, the menstrual pain returned a little, but I gave $\frac{2}{3}$ grain on the day preceding the flow and the first two days of the period, and found that this controls the pain better than any other agent. I keep her in bed during the period, but between times she is able to sit up and outside for about ten hours a day. She is steadily improving, and I hope will be able to go for a holiday next month. But for the influenza, I feel sure she would have been about by now.

I greatly regret that emetine was not tried in the first

illness, but it was even less known of then. The soothing effect on the bowel is miraculous, and I intend trying it in some cases of summer diarrhœa this year, in smaller doses— $\frac{1}{8}$ — $\frac{1}{6}$ grain—in children.

This is the only case of colitis that I have been able to treat since I tried emetine, but the result, to me at any rate, has been very convincing, and I shall unhesitatingly use it as my first remedy in future cases.

4. *Dysmenorrhœa*.—The comfort which my patient with colitis gained during the periods, encouraged me to try emetine in ordinary cases of dysmenorrhœa, when nothing definite could be found causing the pain. Most of the cases had been subject to very painful periods for many years. Again, I find doses of $\frac{2}{3}$ grain daily are needed for the day preceding the probable onset, and the first two or three days of the period. If I inject only $\frac{1}{3}$ grain in the morning, the effect wears off late at night and the pain returns. Nothing would be gained by giving detailed accounts of the patients. Suffice it to say, that they were most of them of the usual type in which one meets this trouble—toxic patients, unmarried, often constipated, usually dark-skinned, and with cold extremities and dull facial expression. Naturally, the emetine does not cure the condition, but to my mind it alleviates it better than any other method I know of, without being in the slightest degree a “depressant.”

Ovaritis, pelvic adhesions, and other diagnoses had been applied to these cases, without—as far as I could find—any justification whatever, and my treatment for them is anodal galvanism, abdominal exercises, and paraffin regularly, with periodic use of emetine, and I am glad to find that this gives them some relief.

I hope that this may encourage others to give this useful drug a trial. My experience with it is comparatively small, but it seems to be of such use in mucous colitis and dysmenorrhœa that are not readily amenable to usual methods of treatment, and is quicker and more reliable in action than other remedies usually employed in phthisis and intestinal hæmorrhage. I think that emetine will in future be used more widely in medicine, and if these lines contribute to that end, they will not have been written in vain.

ON THE VALUATION OF THERAPEUTIC RESULTS.

By EDMUND HUGHES, M.R.C.S., L.R.C.P.

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IN modern times, and especially for the last few decades, therapeutic methods of all kinds have steadily been accumulating, at a rate far outstripping our genuine knowledge of their value. This plethora of remedies has its commendable side, if we regard it as a necessary outcome of fertility of ideas and vigour of research. Again, as most remedial methods need their value to be settled by a wider experience than can be given them at first, their early introduction to the medical world may enable this to be done; the spirit in which they are launched will then be scientific. On the other hand, the introduction may be accompanied by a false certificate of worth, the required knowledge being assumed, either through sheer want of care or ignorance of the amount or kind of attestation needed. This has become so notorious, both with much of the bigger therapeutics and with a host of lesser remedies, that we are all unpleasantly familiar with it.

But another circumstance favouring this over-accumulation of remedies, besides their introduction in an unproved state, is the handling they receive afterwards. Extended trial must issue in their definite acceptance, definite rejection, or in their value remaining for some reasons undetermined. This last class, we well know, unduly preponderates; not so much because extended trials are insufficient, but because they are not made. Many a method after a little inconclusive testing falls into neglect, or else is set drifting, as it were, with a permanent query-mark attached. In this way, remedies having genuine value may easily become lost to us, because their range of action, being perhaps limited, is never found.

Again, for many acute and chronic states half-a-dozen or more therapeutic methods come to be enumerated in the books,

without any proof of their respective merits. Though without real credentials, they all appear each time, much like poor relations at a wedding, dubious yet hopeful—seeming to expect at least some casual recognition on the strength of the past. One can picture the injurious effect of all this confusion on the student's mind. Being born into it, he is never likely to realize the irrational habit engendered in his ideas, and the extent to which this is going to react on his patients. These latter again, seeing the strange diversity of treatment they receive, as they pass from one doctor to another, and the non-fulfilment of the expectations aroused in each case, become distrustful of a profession which does not appear to know its own mind. There is, finally, the disrepute into which medicine thereby falls among other sciences, where, though data and inference vary in exactness, still the principle of carrying these to the limit of possible exactness is more carefully observed.

As the general truth of what has already been said will not be disputed, no specific examples need be given. In fact, it would be easy for any one of us to supply, out of his own experience and knowledge, a score of familiar diseases in the treatment of which the above statements hold good. Their truth, however, is certainly most vividly appreciated by attentive students of current medical literature, even for the last decade, and by those who have inquired into the various causes militating against certainty. These causes deserve a short study, for they are interesting in themselves, are not all obvious at a glance, and, moreover, are highly important for us to know. When we are ignorant of the strength and character of an enemy, we are in a bad position to put up a resistance.

The personal or subjective causes are so well understood that little need be said about them. The time-honoured plan, when a question has to be settled, is for men to divide themselves up forthwith into believers, unbelievers, and doubters, and let the matter decide itself; we are not exempt from this kind of weakness. There is the usual unconscious bias, the common vice of all scientific work. Prof. J. A. Thomson, in some recent remarks on scientific method in general, alludes to "rough and ready records,

reliance on vague impressions, acceptance of second-hand evidence, and picking the facts that suit." The causes on this side can be summed up as either negligence or ignorance—neglect to obtain the knowledge needed for proof, or ignorance of what knowledge needs to be obtained. These faults seem usually to be combined, so as to react on each other; indeed, it is hopeless to expect a mind that has no grip on the elementary requirements of proof to feel any urging to satisfy them. It follows that for a corrective to this mental *impasse* we must look not to nature but to art; that is, each mind, whatever its native faculty, should be required to observe certain ready-made principles, once these have been ascertained to meet the needs of the situation.

The impersonal causes are the difficulties inherent in the subject as such. To illustrate the various difficulties in the path of inductive reasoning, hardly a better example could be chosen than the action of a would-be therapeutic agent on the body; accordingly, we find it seized upon for that purpose by the acutest reasoner of the last century. But by arguing these difficulties on theoretical grounds, Mill succeeded in over-stating them. Indeed, if so argued they could never be solved at all, except by ideal means. If Mill had had a medical training and experience of the body, he would have realized that the difficulties, great as they are, do not invalidate our judgements to the extent he supposed. They can still further be diminished by professional organization, discovery, and method. In short, though perfect solutions are impossible, it is quite within our power to possess ourselves of data sufficient in number and kind to satisfy certain practicable rules, and so to form conclusions accurate enough for the uses they have to serve. These rules will be found to emerge severally from the discussion that follows.

(1) In our therapeutic reasonings we make large and confident use of the inductive form of argument, as when we affirm that a therapeutic agent found beneficial in a limited number of cases of a disease will be found beneficial in all cases of that disease. The uncertainty contained in the form of an induction is, I think, best exhibited by simply recasting the statement it makes. Thus, as it is the same here whether we view "all cases" collectively, or every one apart, the same

argument can be asserted as an indefinite number of syllogisms, each formally fallacious.

Some cases of X have been cured by B remedy.

This is another case of X.

Therefore it will be cured by B remedy : and so on.

Since an induction is denied all validity by its form, it can acquire validity only through its contents ; in proportion, for example, as we are able to know that the agreement it assumes between the known particulars and the unknown is a real agreement. If we had the highest certainty of this, it would be necessary to examine one particular only, in order to have examined all. Such certainty is only possible when the particulars are abstractions of the mind, and so can be made identical by definition. In the natural sciences, complete uniformity of the particulars in respect of a conclusion about them cannot be premised, but has to be searched for. It is mere evasion to demand that, for the conclusion to apply to them, they must be uniform in such and such ways ; we must satisfy ourselves that the required uniformity does occur in nature with each case. Now, in the exact sciences a certain probability is given to induction on a narrow basis of fact by the general principle of uniformity of nature. But in our inexact science appeal to this principle is at best superfluous, and often disallowed, because our notion of the identity of the particulars must often depend on so fallible a basis as human observation, and the shifting plans of classification which result. It will, therefore, be clear that the value of our inductive reasoning in therapeutics will be determined, in the first place, by the meaning we attach to the term identity.

In physical science, owing to the simplicity of the phenomena considered, a relatively high degree of uniformity can often be assumed among them, frequently extending to an agreement as to quality in given respects, mode or behaviour, quantity and time-relations. But with us the idea of identity is far more restricted, and amounts to a conception of uniformity only in quality and mode. In what follows, therefore, the word will be understood in this limited sense. But besides this general limitation in our use of the word, several differing values come to be assigned to its particular uses. Here, for

example, when we are applying it to material to be treated, there is the case in which we know the cause of the disease, and detect this cause directly ; next, that in which we know the cause, and infer its presence by some indirect test ; third, when we are ignorant of the cause, and infer identity by consideration of all the effects ; fourth, when, not knowing the cause, we infer identity by considering some of the effects. If, now, we go on to inquire how we form identity-groups from a study of disease-effects alone, we perceive yet further variations in our notion of identity. In differentiating among disease-effects, we continue till the point is reached at which any series so far conforms to one type that further distinction seems useless, on grounds of analogy. That point is more easily reached and more safely depended upon, in proportion to the number and distinctiveness of the characters making up the type. The simpler the type is, the more probable the true identity of the cases conforming to it ; the more probable, therefore, that they have an identical cause.

Now it is evident that this method of establishing identities, though often successful, involves on the whole much uncertainty, and the same uncertainty is liable to affect our conclusions on the therapeutic side. This is best seen by taking some instance in which the idea of identity has moved through several stages of exactness in our own times. Thus, "lobar pneumonia" has only latterly become a generic name, including several varieties, each with a distinct cause. Yet even now it is the rule to find therapeutic means practised against "pneumonia." From what we know, however, of the surprising specificity of bio-chemical reactions, it is at least a rational possibility that a remedy might have a selective action against one variety alone ; in which case, it would appear to succeed or fail according to the chance numerical incidence of that variety, *e.g.*, the pneumococcal, and would thus fall into undeserved discredit.

Our analysis so far will make clearer the importance of a rule too often neglected in clinical work, that *all cases treated as instances of an identical disease should be known to be so.*

(2) It is not at all rare to find such assertions made as these : that, in some cases, a remedy has succeeded in cutting

short the symptoms and signs; in others, though not succeeding so brilliantly, that it showed at any rate a valuable expectorant effect; in others, again, that it could be seen to relieve the pain, and conduced to the general comfort of the patient, if doing no more; and so on. There is here a failure to perceive that each separate assertion widens the sources of fallacy, and so redoubles the labour of proof. Though the statements are intended to show that the remedy does behave as such, they do just the opposite, and prevent our ever knowing that. Whether, therefore, the effects are viewed as one or several, they must be shown to appear as a total effect, and in the same relation to the general train of events consequent on the dose. They must, in short, have identity, in the sense we have assigned to that word. The following rule may, therefore, be stated at once in regard to positive effects, that *for the same disease, and the same amount or dose of the remedy, effects ascribed to the remedy must be identical.*

(3) The rule just given applies in our search after positive effects. It will often happen, however, that in a series in which we think we have detected positive and uniform effects, cases occur in which no effect is apparent, or none at least which we have learnt, rightly or wrongly, to anticipate. Our judgement of these does not depend on their numerical proportion in the series, but on our power to trace the reasons for the difference in their results. When the anticipated effect is not found, we seek to know the whole cause preventing it. But we cannot be said to know the cause unless we ourselves can apply it, and observe that it has this action. A familiar example is that of hexamine, the bactericidal effect of which in the urinary tract can be abolished or restored, according as the medium is made alkaline or acid. Failing this direct knowledge of the cause, we try to ascertain some of the conditions which form part of it, our aim then being to show that some variation existed either in the character of the case, or in some circumstance connected with it.

Theoretically, any sort of variations might conceivably alter the effect; but in practice, variations must be relatively definite and measurable, or they cannot be appealed to. For example, if we adduce the unusual amount of delirium and prostration

in a disease commonly attended by both, the difficulty of measuring such signs as these makes them valueless as criteria. Moreover, in cases showing no definite departure from type, but only varying in the greater intensity of their symptoms, absence of the effect, so far from being excusable on that ground, is rather an argument against the remedy having real efficacy in that disease. For when the effect has to be estimated by a mortality-rate, the sole test of a remedy will be in its influence over those cases which would end, or be expected to end, fatally; and the like statement holds good in any disease for the class of case we style "unfavourable."

To guard against the common tendency to plead mere severity as a sufficient cause of failure, the variations adduced should be at once definite enough to be estimable by all observers alike, and be not merely in degree, but in kind, such as a complication not part of that disease, or a concomitant in the shape of an intercurrent or pre-existing disease, or else a definite difference in the circumstances; for example, the stage of the disease at which the remedy was begun. These all afford a fair presumption that other causes have been present, the action of which may have nullified the effect looked for; this opinion is decidedly strengthened, if further observations show that in like cases, and only in these, the effect is similarly absent.

This part of our subject will be seen to be merely a particular case of the general inductive principle known as the method of concomitant variations, and may be condensed into a rule, intended to apply only when enough cases have been observed to give our expectations definite shape, as follows:—

If the anticipated effect does not occur, its absence must be explicable, either (a) by direct knowledge of a preventing cause, or (b) by finding in the character of the case some qualitative variation from those cases in which the effect occurred, or a definite difference in the accompanying circumstances, and further, by finding that the effect is absent in other cases having the same variation or difference, and in these alone.

(4) If, now, we know that the material we are treating as identical is so; if we have observed in it many instances

of identical ameliorative effects under the same dosage of the same remedy, and if the cases not showing these effects can be shown to vary definitely as required, it might be thought that we had already done all that accuracy could demand of us in a difficult task. Certainly, we have done more than is usually done; yet we have furnished no decisive proof that the cause we have been studying is the remedy in question. This final step, of showing certain consequents of a remedy to be its real effects, must now occupy us.

The mistaking of mere consequents for the effects we are in search of is, of course, the outstanding error, and the rules so far discussed are so many needful ways of providing against it. Our peculiar liability to this error is partly due to a difficulty noticed at some length earlier in this paper. We there saw how our inexact notion of identity may affect our choice of material, and reasoning upon it. Similarly, when we conceive of identity among results of treatment, all we really can mean is that the results agree in quality and general mode of happening. But events for which not strict identity, but only this close similarity, can be claimed, may just as well have had several causes as one. The mere fact of reduction or disappearance of certain signs and symptoms of disease does not more strongly suggest one particular mode of causation than several. The mind not keenly aware of this will not be able to help in solving therapeutic problems, but will probably drift into that kind of empiricism which is content to found on appearances, and looks no further.

On the other hand, he who clearly discerns this source of fallacy will very properly shun any single-handed attempt to remove it, and will either take refuge in scepticism, or else in some theory of remedial action which offers the security he needs. Now, a theory expressing all the relations involved would enable us to deduce unerringly both the proper remedy and its effect; we should then only need to know the disease before us, and to have the remedy ready for use. But an incomplete theory will only succeed when the relations involved happen to be those expressed by the theory, and these cases may be many or few in a series, as chance may determine. Theories, however, of that kind, which seem complete because easily formulated and thought

about, are attractive enough to lead for a long time to mental illusion regarding their results in practice ; an illusion kept up by that very "plurality of causes" over which theory is intended to triumph.

Until, therefore, we secure our Newton or our Mendeléeff, the only path to therapeutic precision will be through experimental inquiry, and it only remains to see how to conduct this tedious business so as to obtain a maximum of information with a minimum of effort.

The method to be followed, which is followed now here and there with great caution and pains, is that of experimental science in general, and so will only be outlined here in the briefest way ; but certain points in it need a little closer study. The first step is to find whether a given remedial method has any value at all. To find this, we must first ascertain the results which follow in the given disease from a uniform set of conditions in the absence of the remedy, and afterwards apply the same conditions together with the remedy in further series. Assuming this to be done with care and thoroughness, we have answered, by means of an approximate mean figure, both the question whether the remedy has a value, and what value it has in comparison with a certain set of conditions. We have thus obtained two quantities out of any three which will need to be known in each instance as the inquiry proceeds. That these two quantities may continue to be valid the same uniform conditions that were applied at this first step must be applied at every subsequent step. The further steps will concern the value of other remedies for the same diseased state, and consist in the application of one remedy at a time to different series of cases numerically equal, and corresponding as nearly as practicable in other respects. From the results so obtained, the various remedies can be compared together.

We spoke of a uniform set of conditions. This could only be imposed when the conditions are under our control, in chronic cases temporarily, in acute cases entirely ; but a very little reflection will show how important this is. The first question the therapist should ask himself is, whether the course of events he has observed with his remedy could have occurred without it. He can supply no answer, unless he

already knows what could happen without the remedy. But where is he to get that information? Perhaps he has some vague notion of a total "natural" course, which a disease will follow if "left to itself." But on further analysis, that turns out to be illusory. Conditions we know to be influential on most morbid processes, *e.g.*, diet, rest, aëration of the blood, and so on, may and do vary widely "in nature." He should, therefore, on making his much-needed comparison, have in mind wherever possible the results already ascertained to follow a uniform set of conditions applied to that disease, and which he has been able to preserve in his experiment with the remedy. These conditions should be such that they can be re-applied; that is, they should be as simple as possible, and conform to the elementary needs of the body in the disease under consideration. By this method we should gain a standard picture, a standard set of results, serving as a definite base-line for our inferences.

The plain need of applying one remedy at a time would not require special mention, if it were not so persistently disregarded. Against the empiricist objection, that it matters little how a cure is brought about so long as the patient recovers, must be placed the vastly superior importance to the whole number of patients of our knowing what agents are really effective in that disease, and how far they are effective. How, for example, is it possible to gauge the effect of tuberculin if given along with the open air method, a special diet, and perhaps a system of graduated rest and exercise in addition? It is open to us to regard any set of remedial measures as a standard treatment, but the more elaborate this is made, the greater the practical difficulties of a research which under the simplest conditions is laborious enough.

This takes us, finally, to the question of length and number of series. There is no exact rule governing such matters. All inductive inquiry in science comes to rest where rational conviction is attained, its conclusions having certainty only in the sense that we can rely upon and use them with confidence in further work and thought. Here, the length and number of series can be decided only by the character of the disease, and the guaranteeing of averages. The wider the known variation of the feature we are studying, the longer our therapeutic

series ; and *vice versâ*. Again, the results of any series should not be found to fall outside the extremes from which a mean has already been derived. When we compare the results of two series or sets of series, that with and that without the remedy, a fair rule might be made that, *ceteris paribus*, the least favourable result with the remedy should be better than the most favourable result without it.

There can be no doubt, in short, that by applying what Huxley would have called "organized common-sense" in greater measure to work of this kind, we should soon begin to lighten the incubus of guess-work and insecurity, which perpetually weighs upon this subject. The foregoing remarks may be summarized as follows :—

The discrimination between real and apparent effects of a remedy should be carried out by the recognized methods of experimental (inductive) inquiry, aided by the use of results of uniform simple modes of treatment as standards of comparison, and so designed as to discount the relatively large weight of experimental error by average figures from series of sufficient length.

In conclusion, there is a somewhat wide though not impassable gulf between this bare statement of method and its performance. To a very limited and partial extent, it may be said to be practised now, and there is no reason why we should not ultimately obtain a verdict on any new remedial method of importance in twelve months, which now remains *sub judice* for as many years, if not altogether. It is surely not very Utopian to look forward to the creation of an international bureau, which shall organize such research, and collect and publish the evidence—in that happy time when patriotic rancour can no longer raise barriers, and the implication of science and its general aims with the narrower interests of nations and politics, is a thing of the past.



THE VICIOUS CIRCLES OF HABITUAL CONSTIPATION.

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HABITUAL constipation is one of the commonest ills of civilized life. The disorder may be congenital or acquired, local or constitutional, physical or psychical, trivial or fatal. No age, no sex, no occupation, no race, no climate is immune. In brief, the disorder is of well-nigh universal interest, particularly to the physician, the sociologist, the psychologist, the teacher.

It is mainly owing to the establishment of Vicious Circles that constipation so frequently becomes habitual, self-aggravating, and self-perpetuating. Hence the importance that the physician should be familiar with this morbid process, so that he may prevent its development, or, if that be impossible, arrest its progress. The study of the Circle will supply, so to speak, a master-key which will unlock some of the secret chambers of disease, and reveal the intricate machinery that has been thrown out of gear.

Some illustrations of Circles associated with habitual constipation may now be given. It will be convenient to deal in order with constitutional and with local conditions.

I.—CIRCLES ASSOCIATED WITH CONSTITUTIONAL DISORDERS.

NEURASTHENIA.

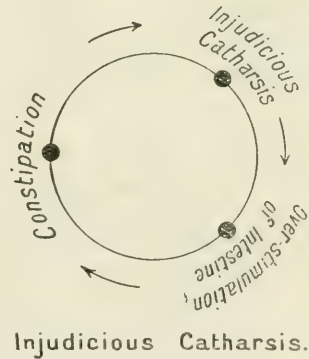
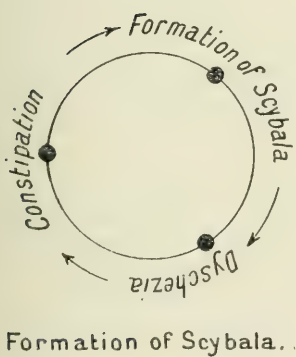
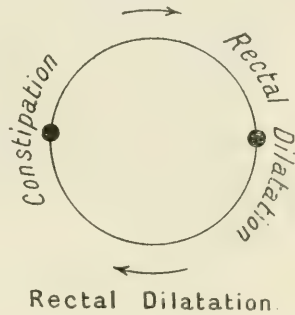
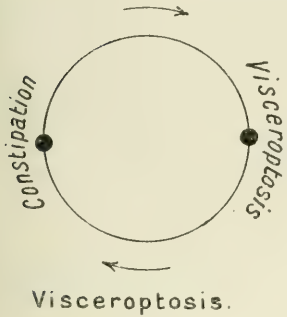
Neurasthenia, owing to the associated weakened peristalsis, frequently gives rise to constipation, and this intensifies the neurasthenia.

Strümpell¹ writes :—

“Habitual constipation is frequently associated with general neurasthenia. The nature of this association is probably not the same in every case. Often neurasthenia and constipation seem

¹ *Text-book of Medicine*, 1911, Vol. I., p. 611.

to be co-ordinate symptoms; sometimes existing constipation has an unfavourable effect upon the psychical conditions of patients, rendering them feeble, fretful, out of sorts, and nervous. As a rule, however, neurasthenia is the primary disease, and then the irregularity of the bowel appears as a result of abnormal nervous influences or secondary conditions. Often the two states act in a Vicious Circle, each sustaining and aggravating the other."



Vicious Circles of Habitual Constipation.

BLUNTING OF THE DEFÆCATION REFLEX.

Gant¹ also writes :—

"There has been a great deal of controversy recently regarding the rôle played by constipation and coprostasis in causing certain disturbances of the nervous system, and also as to the influences of some nervous diseases upon the origin of constipation The important thing to remember is that when either of these two

¹ *Constipation and Intestinal Obstruction*, p. 132.

conditions is present and the other develops, the patient's condition is made more deplorable, for the reason that each aggravates the other, thereby establishing a Vicious Circle."

Where there is great psychical irritability, another Circle may complicate neurasthenia, as Gant points out :—

"The mind has a powerful influence for good or bad upon the act of defæcation. Consequently, persons who permit themselves to become greatly worried and excited because they do not have an action when they think they should, or because the amount, consistence or shape of the stool is not up to their standard, aggravate their condition by working themselves into such a nervous state that they are unable to concentrate the mind, and in this way assist in the act of defæcation, when the time for the expulsion of the fæces has arrived."

And again :—

"Such individuals through their anxiety aggravate their condition and, in consequence, become the victims of habitual constipation." ¹

DYSPEPSIA.

There are various forms of dyspepsia, which combine with constipation to establish a Circle. For example, atonic dyspepsia leads to anorexia, to insufficient ingestion of food, and consequently to inadequate stimulation to peristalsis. The resulting costiveness perpetuates the anorexia.

Hertz ² alludes to this Circle :—

"In many cases, in which dyspepsia is associated with constipation, there is a Vicious Circle at work. Owing to the anorexia produced by the constipation too little food is taken ; this not only aggravates the constipation, but it also tends to produce atonic dyspepsia, both of which conditions react on each other."

This Circle is often present in chlorotic girls, many of whom suffer from habitual constipation, which is probably due to sluggishness of the intestinal muscles. This constipation then leads to diminished appetite, diminished ingestion of food, and consequently insufficient stimulation of the peristaltic movements and continued constipation.

Moreover, some chlorotics attribute the distension of their tissues by water to subcutaneous fat and, therefore, purposely restrict their diet to a minimum, and in this way also perpetuate their chlorosis and constipation.

¹ *Constipation and Intestinal Obstruction*, pp. 130, 133.

² *Constipation and Allied Intestinal Disorders*, p. 182.

OBESITY.

Obese persons frequently suffer from constipation and this tends to further obesity.

Pick and Hecht¹ write :—

“Very often subjects of obesity suffer from constipation. There arises thereby a Vicious Circle, the ingested food being absorbed to the greatest extent due to the constipation, this constipation being again increased by the corpulence, the retarded circulation, and the venous stasis.”

Sawyer² also writes :—

“Fatness of abdominal walls and abdominal contents favours constipation, while constipation disposes to fatness, and especially to intra-abdominal fattiness. Here is a Vicious Circle, of therapeutic suggestiveness.”

TOXÆMIA.

The susceptibility of individuals to the absorption of toxins varies greatly, owing to causes which at present are unknown. Thus, while habitual constipation at times appears to have little influence on the general health, in other cases coprostasis is soon followed by the absorption of toxins, which tend to weaken peristalsis and maintain the stasis.

E. von Ofenheim³ writes :—

“The question is what is the effect of the stasis on the bacteria, and, *vice versa*, of the bacterial toxins on the stasis? That between them exists a Vicious Circle has repeatedly been proved. Stasis causes bacterial poisons to be formed—these poisons, again, have a paralysing effect on the intestines, and in this way add to the stasis.”

INSUFFICIENT EXERCISE.

Many persons, such as clerks and dressmakers, have insufficient opportunity for active outdoor exercise. For this reason, as well as because a sedentary life leads to less food being taken, such persons often suffer from habitual constipation. This constipation in turn induces a torpor of mind and body, which lowers the desire for exercise, and intensifies the

¹ *Clinical Symptomatology*, tr. by Koessler, p. 20.

² *Coprostasis*, p. 16.

³ *Proc. R. S. of Medicine*, 1913, Vol. VI., Part I., “Alimentary Toxæmia,” p. 326.

costiveness.

Further, want of exercise weakens the muscles concerned in defæcation, *e.g.*, the diaphragm and abdominal muscles, leading to dyschezia. An additional factor is the loss of the mechanical stimulation of the intestines, due to the excursions of the diaphragm associated with active exercise.

The constipation so common in heart disease is probably largely due to the inability of the cardiopath to take normal exercise.

Pick and Hecht¹ describe the Circle:—

“In all forms of cardiac weakness (myocardial affections) constipation may arise, and this again reacts unfavourably on the cardiac action. For it leads to more or less pronounced meteorism, hindering in this way the action of the diaphragm, whose normal action is so important for the circulation, especially in its venous part.”

II.—CIRCLES ASSOCIATED WITH LOCAL DISORDERS.

We may commence with the lower section of the alimentary canal, which is most directly concerned in constipation.

The commonest cause of chronic constipation is probably the habitual disregard of the natural call to defæcation, for such disregard is followed by a blunting of the associated reflex and increased constipation. In course of time there results a progressive lessening of sensitiveness to natural stimuli, and the disorder thus perpetuates itself.

Again, fæces, when unduly retained in the rectum, lose much of their contained liquid by absorption, and form dry and hard scybala. These are difficult of expulsion, and thus favour further retention.

DILATATION OF THE RECTUM.

Fæcal stasis in the rectum, when persistently neglected, is apt to result in atony and dilatation of the rectum, conditions which aggravate the primary stasis. The dilatation thus induced may affect the whole circumference of the bowel. In other cases, the rectum becomes the seat of local pouching, a condition more especially met with in old age. The pouching results from, as well as causes, constipation.

¹ *Clinical Symptomatology*, p. 385.

J. L. Nascher¹ describes the process:—

“The weakening and waste of muscle fibres, whereby peristaltic activity is diminished, is frequently accompanied by neglect of the aged to attend the call of evacuation of the bowel, and this last is the main cause of the dilatation of the colon and rectum, whereby pouches are formed. Here we see one of the many Vicious Circles which are found in old age. The diminished elasticity of muscle permits dilatation of the gut, which consequently becomes filled with fecal matter distending the bowel, this distension further stretching the fibres and impairing their elasticity.”

A similar condition may lead to the formation of a rectocele, such as is common in women. As the fæces collect in the sac caused by the bulging rectal wall, great straining at stool is required to expel the fæces. This straining increases the size of the pouch, leading to further lodgement and increased straining.

DYSCHIEZIA.

Painful defæcation is another cause of habitual constipation, since it inhibits peristalsis, and postpones expulsive efforts. Such constipation may again increase the lesion which caused the pain.

Robin and Dalché² refer to some of the forms of dyschezia, which are met with in women :

“A uterine displacement, a peri-uterine phlegmasia, a hæmatocele, a salpingitis, a fibroid, etc., may act mechanically and give rise to constipation, which is followed by quite a number of dyspeptic symptoms . . . On the other hand, constipation may itself do harm to a healthy uterus, and by means of a Vicious Circle may aggravate the uterine disorders to which it was primarily due.”

In neurasthenic persons, the ovary, even when healthy, may become tender and cause pain when scybala pass over it. Such pain may then tempt the women to postpone defæcation, with the result that she gets harder scybala and more pain.

Various other conditions that cause painful defæcation are thus described by Pick and Hecht³ :

“Other sequelæ of chronic constipation are rectal prolapse, rectal

¹ *Geriatrics*, p. 34.

² *Traitement Médical des Maladies des Femmes*, p. 18.

³ *Clinical Symptomatology*, tr. by Koessler, p. 374. Cf. also Trousseau : *Clinical Medicine*, Vol. IV., pp. 187, 199, 201. Earle : *Diseases of the Anus, Rectum, and Sigmoid*, p. 165.

fissures, hæmorrhoids, and umbilical and inguinal hernias—conditions which of themselves may again increase constipation by rendering defæcation painful and in this way produce an inhibiting action."

SPASM OF THE SPHINCTER ANI.

Habitual constipation is, at times, kept up by spasm of the sphincter caused by hæmorrhoids or anal fissure. These conditions act and react on each other, and retard recovery.

Ball¹ thus refers to the Circle associated with fissure of the anus and spasm of the sphincter :—

"As a result of the constant motion and distention, and by the lodgment of particles of fæces in the rent, continued irritation is set up, which, in turn, occasions spasm of the sphincter. The spasm once started, the irritation is increased, and so a Vicious Circle is established, and the result is that the ulcer is never allowed to heal."

RECTAL MALFORMATION.

An S-shaped rectum sometimes causes constipation, owing to the loops of the S being pressed together and elongated laterally. The condition is apt to grow steadily worse, owing to the associated straining which elongates the loops, especially as the pressure is in the direction of the long axis of the body, and at right angles to the length of the loops.²

A somewhat similar condition arises when fæcal accumulation in the pelvic colon diminishes the pelvi-rectal angle so as to obstruct the passage of fæces. Such obstruction in its turn aggravates the accumulation. Hertz gives an excellent diagram illustrating such pelvi-rectal obstruction.³

HYPERTROPHY OF THE SPHINCTER AND LEVATOR ANI MUSCLES.

Hypertrophy of the sphincter and levator ani muscles is an occasional result of constipation, and, in its turn, perpetuates that disorder.

In regard to the sphincter, Gant⁴ writes :—

"Constipation may have much to do with producing hypertrophy of the anal muscle, especially when nodular fæces are frequently allowed to accumulate and remain in the rectum, acting as a source

¹ *The Rectum and Anus*, p. 131.

² *Proc. R. S. of Med.*, 1911, Vol. V., "Electrotherapeutics," p. 30. Trousseau; *Clinical Medicine*, Vol. IV., p. 207.

³ *Constipation and Allied Intestinal Disorders*, p. 151.

⁴ *Constipation and Intestinal Obstruction*, p. 121.

of irritation. On the other hand, hypertrophy of the sphincter ani may cause chronic infrequent and insufficient evacuations."

Under normal conditions, the levator ani assists in defæcation by compressing and emptying the rectum. But, according to Gant,¹ as a result of chronic constipation, it may undergo hypertrophy, become irritable, and through spasmodic contractions perpetuate the constipation to which it was originally due.

According to Ludwig Pincus,² a Circle is not infrequently established between the voluntary and involuntary muscles of defæcation:—

"The inadequacy of the voluntary muscles, *causa efficiens proxima*, combines with . . . the secondary conditions, *causæ remotæ* (as so often happens in pathology), to form a *circulus vitiosus*."

COLONIC STASIS.

Fæcal stasis in the colon is frequently a self-aggravating condition. For, as a result of the stasis, increased absorption of the liquid elements takes place; the fæces become dry and hard, and this promotes further delay. Stasis is thus both cause and effect of stasis.

Mummery³ refers to this condition:

"The longer fæcal material is delayed in its passage along the colon, the harder will it become, owing to the absorption of water by the bowel walls; and the harder it becomes, the less easily will it be driven on by peristalsis, so that a Vicious Circle is soon established."

Closely allied to fæcal stasis is a condition of over-distension of the intestines due to flatulence. Such over-distension is a further self-perpetuating condition.

Hertz⁴ writes:

"Intestinal flatulence is a cause as well as a result of constipation. The larger the lumen of a muscular tube, the greater is the force required to produce an increase of pressure within it. Hence the muscle of distended intestines has to contract with unusual force in order to maintain the normal rate of progress of the fæces. As the distension diminishes its contractile power, it

¹ *Loc. cit.*, pp. 120, 162.

² "Constipatio Muscularis s. Traumatica Mulieris Chronica (Volkman's *Sammlung klinischer Vorträge (Gynäkologie)*, N.S., Nos. 165-194 (1907-9), p. 178).

³ *Diseases of the Colon*, p. 219.

⁴ *Constipation and Allied Intestinal Disorders*, pp. 56, 186.

is often incapable of doing this, and constipation results, or, if already present, it is rendered worse."

Binswanger¹ also writes :

"The subsequent effects of chronic constipation create a most injurious Vicious Circle. For the accumulated fæces lead to further arrest of peristalsis, and thus to further accumulation, as well as to a greater production of flatus. If the condition is prolonged, . . . the large intestines may become completely relaxed."

VISCEROPTOSIS.

Visceroptosis and habitual constipation frequently aid and abet each other. A striking example occurs when the transverse colon forms an M-shaped loop descending into the pelvis. The longer the loop the greater the tendency to an accumulation of fæces, while the accumulated fæces favour further elongation and descent. In connection with visceroptosis, adhesions are apt to form at the various intestinal flexures, causing permanent kinking of the gut and aggravation of the stasis, as Lane has so clearly pointed out. The accumulation of flatus in the colon acts in the same direction.

Mummery² writes :

"When once any marked degree of meteorism has occurred, a Vicious Circle is established: the extreme dilatation of the colon tends to produce kinks and angles in the bowel, which cause obstruction to the lumen; moreover, the stretching of the bowel wall further paralyses the muscular walls in the same way that stretching the anal sphincter paralyses that muscle. It is owing to the establishment of this Vicious Circle that the condition of meteorism, once well established, is extremely difficult to deal with successfully."

In some persons, especially in multiparous women, the abdominal muscles become so stretched as greatly to interfere with efficient defæcation. This condition is often associated with visceroptosis, and gives rise to a general disturbance of the normal intra-abdominal pressure relations. Such a disturbance is both cause and effect of constipation.

Thus Cautru and Bourcart³ write :

"The constipation is a symptom rather than a cause of the

¹ *Pathologie und Therapie der Neurasthenie*, p. 255.

² *Diseases of the Colon*, p. 35.

³ *Le Ventre*, Vol. II., pp. 202, 207.

disturbed abdominal equilibrium. But the disorders brought on in the organism by that constipation may in turn aggravate the disturbed equilibrium, and thus establish a Vicious Circle."

According to Barrington-Ward,¹ constipation in infants is often due to anomalies of the mesentery.

"From the breast-fed baby upwards, constipation shown by the infrequency of the motions is exceedingly common. There is a great variation in the peritoneal relations of even the youngest children. In some cases the entire large intestine floats freely on a well-developed mesentery; in others the bowel is fixed back to the abdominal wall at various points or throughout its whole length. Such variations must have a profound influence on the functions of the tract, and explain why, in some cases, constipation occurs. When constipation of any degree is established, a Vicious Circle is set up."

CATARRH OF THE COLON.

Catarrh of the colon is often due to constipation, and in turn perpetuates that condition.

Hertz ² writes :

"When fæcal masses are retained in the large intestine for a longer period than normal, they become dry and hard. Sometimes no injury to the mucous membrane results, but more often the mechanical and chemical irritation gives rise to catarrhal inflammation. . . . This may lead to atony of the muscular coat which further increases the severity of the constipation."

SPASM OF THE COLON.

The irritation of retained fæces sometimes causes spasm of the colon, and this in its turn perpetuates the retention.

Mathieu and Roux ³ write :—

"Not only does the spasm cause and keep up the constipation, but the constipation in its turn keeps up the spasm and the colitis."

and again :

"Under the influence of spasm fæcal matters are retained in the intestine which is thus kept in a state of constant irritation. This irritation then provokes painful manifestations and various reflexes, some of short, some of long circuit. Those of short circuit are confined to the intestinal walls, while the longer ones take a

¹ *Trans. Medical S. of London*, 1913, p. 101.

² *Constipation and Allied Intestinal Disorders*, pp. 71, 224.

³ *Pathologie Gastro-Intestinale*, Series III., 1911, pp. 93, 303. Cf. also Series I., 1909, pp. 442, 448.

further route, and involve the abdominal plexuses. These spasmodic reflexes in their turn perpetuate the constipation and the intestinal irritation. Thus is formed a Vicious Circle which, when once established, shows no tendency to disappear spontaneously."

TYPHLITIS.

Chronic typhlitis is sometimes associated with habitual constipation both as cause and effect. This is largely due to the erect posture, which makes it difficult for the cæcum to evacuate its contents. The resulting stasis tires out the muscular walls and leads to dilatation, thus further aggravating the stasis.

Corner¹ writes :

"Owing to the 'rest' of the products of digestion in the cæcum . . . the fermentative processes initiated in the appendix will proceed to further stages in the cæcum. As a result a secondary subacute or chronic typhlitis is started which leads to interference with the muscular action of the cæcum and further retention of the contained fermenting faecal mass. In this way a Vicious Circle has been started, and the processes and their results may extend along the colon from segment to segment."

APPENDICITIS.

Much the same condition may implicate the appendix, which may become inflamed as a result of chronic constipation, and in its turn maintain that condition.

Gant² writes :

"The appendix is of importance because it frequently becomes inflamed as a result of constipation and faecal impaction, and, conversely, when it becomes diseased, it may itself induce costiveness."

DISORDERS OF THE SMALL INTESTINES.

Habitual constipation is not so frequently associated with the small as with the large intestines. Nevertheless, some of the same causal factors described above, such as kinks, ptosis, stasis, defective peristalsis, accumulation of flatulence may at times be operative. The associated Circles need not be again described.

INJUDICIOUS CATHARSIS.

The habitual and injudicious use of active cathartics is

¹ *Surgery of the Diseases of the Vermiform Appendix*, p. 67.

² *Constipation and Intestinal Obstruction*, p. 22.

responsible for a large proportion of the prevalent constipation. Such medicines are liable to over-stimulate the bowels, a condition which is naturally followed by a period of rest and recuperation. Unfortunately, the patient construes such rest as an aggravation of the constipation, calling for stronger aperients, and so the process continues, resulting eventually in intestinal catarrh and muscular atony, and provoking more obstinate coprosthesis.

Wilkinson¹ writes:—

“The use of drugs requires clinical acumen, common sense, and shrewd observation, lest the drugs make matters worse by establishing a still greater inhibition of the ordinary processes, digestive, muscular, and nervous, upon which the regular and complete evacuation of the bowel depends. Such want of skill and care may establish a Vicious Circle, at one segment of which such severe and distressing conditions as membranous colitis, chronic catarrh, and even visceral neurasthenia may obtrude themselves.”

THE BREAKING OF THE CIRCLE.

Whenever a disorder is complicated by a Circle, the primary duty of the physician is to arrest the morbid gyration. No treatment can be called rational that aims at anything short of this. A *sine qua non* for such rational therapeutics is a clear insight into the reciprocally acting factors that maintain the morbid process.

This is pre-eminently true of constipation, the treatment of which, in the main, resolves itself into breaking the one or more Circles that are in operation.

Works on constipation describe a symptom-complex of an endless array of symptoms, *e.g.*, colic, giddiness, loss of appetite, headache, lassitude, tenesmus, hypochondriasis, melancholia, flatulence, furred tongue, sallowness of complexion, nausea, nervousness, etc. The first task of the therapist, therefore, is to extract from the symptom-complex those dominant factors that are perpetuating the process. When these have been elucidated, the sharpest arrow in the medical quiver may be selected for the attack.

As a concrete example, we may select the condition in which constipation and neurasthenia act and react on each other. The malady frequently begins with constipation, for

¹ THE PRACTITIONER, 1910, Vol. I., p. 638.

which aperients are resorted to. As these in course of time lose their effect, coprostasis results, and defæcation becomes more and more difficult. As a further result, there is headache, anorexia, diminution of food, loss of strength, indolence, nosophobia, and neurasthenia. Such persons fail to digest their food, because their nervous system is depressed, while their impaired digestion fails to supply the nerve centres with pure rich blood. If this morbid interaction between the nervous and digestive systems persists, the sufferer may in time be reduced to a condition of a nervous, irritable, melancholic dyspeptic.

In such case, both physical and psychical factors combine to create a Circle, and both physical and psychical treatment will be required to interrupt the morbid gyration.

Physical treatment will aim at re-educating the bowels by such a diet as produces more bulky fæces and stimulates peristalsis. The more regular defæcation will relieve the indolence, and in turn will encourage more active and outdoor exercise. Such healthier habits will create an appetite, promote tissue-waste, and pave the way for more active assimilation and oxygenation. In their turn, these improved conditions will regulate the bowels and promote general progress.

Psychical treatment will be a powerful adjuvant. Persuade the nosophobic pessimist that the disorder is curable, and a long stride towards recovery will already have been taken. Digestive processes will improve; there will be more active co-operation of the voluntary muscles of defæcation, and a sense of hopefulness and expectation will follow. The Vicious Circle will be replaced by a healthy Circle.

The results, indeed, may appear little short of miraculous. Querulous, melancholic, neurasthenic invalids regain an active, useful, happy existence. The physician who achieves such a triumph, may even earn, as Galen did centuries ago, the title of *ιατρός παραδοξοποιός*.¹

¹ A wonder-working physician.



CASE WITH COMMENTS.

INTERESTING CASE OF TRAUMATIC SUBDURAL HÆMORRHAGE.

By H. VINCENT O'SHEA, M.B., B.Ch., B.A.O., L.A.H.I.

Hornsey, N.; Late Resident Surgeon Mercy Hospital, Cork; Late Senior Resident Surgeon District Hospital, Cork.

IN THE PRACTITIONER for August, 1915, some interesting cases of subdural hæmorrhage of traumatic origin were discussed. In view of the fact that such cases are generally supposed to be very rare, the following account of a case with which I met a short time ago may be worth recording.

CASE.

A woman, about 35 years of age, with a history of drink, fell off a chair while in an intoxicated state. Her friends finding nothing wrong with her, assisted her upstairs and put her to bed, thinking she would be better the following morning. On the next day, there was no improvement; the patient was very restless and complained of pain in the head. Still thinking her condition was due to drink, her friends did not send for medical advice until the following day, when I was called in and saw her on the third day after the accident. She was then in a semi-conscious condition, very hot, and perspiring profusely about the head and neck. She was slightly cyanosed, and the breathing was of the Cheyne-Stokes type. The pupils were dilated, equal, and reacted sluggishly to light. On the left side of the body, though no actual paralysis, there was a decided weakness. There were twitchings of the face, neck, and upper extremities. She kept putting her right hand to her head on the same side muttering something unintelligible about pain, and was very irritable when I tried to arouse her. The pulse was very rapid and weak. The patient sank rapidly, and died early the next morning.

Post-mortem Examination.—The following condition was revealed.—The dura mater on the right side was greatly distended with blood, which poured out on making an incision over the membrane. The blood was dark blue and for the most part fluid, extending down the medulla oblongata, which accounted for the marked respiratory symptoms. There was a thin layer of clotted blood on the inner surface of the dura mater. The brain showed no signs of laceration, and there was no fracture of the skull or signs of an injury of any kind. The other organs of the body showed signs of excessive drinking.

This case is interesting because it shows what a serious

condition can be caused by such a slight injury. There is no doubt that the excessive drinking was a predisposing factor, and acted in two ways ; first, by altering the condition of the walls of the blood vessels, which made them more prone to injury ; secondly, the fact that the woman was intoxicated at the time of the accident the blood pressure was increased, which caused the hæmorrhage to be greater and more rapid.

The patient never regained consciousness from the time of the injury till her death. Insensibility, in the first instance due to alcoholic poisoning, passed gradually into the condition caused by the hæmorrhage.

The blood in subdural hæmorrhage, as we know, may come from the cortical veins and capillaries, from injuries to the inner walls of the venous sinuses, or even from a lesion of the middle meningeal artery, when the dura mater has been opened as well.

In this case, the hæmorrhage was venous. The superior longitudinal sinus got torn on opening the dura, so that I could not say whether that was the seat of the hæmorrhage. I am inclined to think, from the large quantity of venous blood present and the fact that the medulla was implicated early, that the hæmorrhage was derived from a lesion of one of the sinuses, most likely the superior longitudinal on account of its close connection with the bone of the skull.



Practical Notes.

TREATMET OF PHTHIRIASIS.

Henri Labbé, as the result of a series of investigations on the parasiticidal properties of various substances, reported to the *Académie de Médecine*, has come to the conclusion that anisol has much the most destructive effect. Its higher homologues, the methyl cresols, are very effective too. Anisol (methyl phenate) is very diffusible, and its vapour very quickly immobilizes the parasite. The time required to kill outright is by no means long, and the nits appear to be quite sterilized. This remarkable lethal effect makes it possible to use the vapour very much diluted. One drop of anisol diffused into a space of 1,500 cubic centimetres, will immobilize the parasite in about six minutes, and kill it in 18 minutes. For the treatment of phthiriasis a $2\frac{1}{2}$ or 5 per cent. solution of anisol in weak alcohol is used. The contact of one drop of this solution kills the louse in half a minute. Sprayed freely on the scalp, the beard, the axillæ, the pubes, and the fold of the buttocks, it destroys without fail the parasites and their nits. This application may be repeated two or three times, if necessary. It has no harmful effect on the skin, and there is no danger of inflammability, for the boiling point of anisol is 152° C. On clothes and under-garments, the lice are completely destroyed by sprinkling them well with the $2\frac{1}{2}$ per cent. solution out of a spray-producer and shutting them up in air-tight chests and leaving them for three hours. If the soldier has no change of clothes, he must be thoroughly well sprayed between his outer and under-garments as well as over all outside, repeated several times. Neither the colour, the appearance, nor the texture are injured by the application.

Labbé recommends the following prescription for the spray:—

Anisol	-	-	-	-	2'5 to 5 c.c.
Essence of verbena (lemon grass)-					2'5 c.c.
Alcohol (90°)	-	-	-	-	45 c.c.
Water to	-	-	-	-	100 c.c.

Usually, one spraying is enough to destroy all the live vermin, which are killed in a few minutes. As the nits are sterilized as well, the complete and rapid destruction of the vermin is assured, with the minimum of inconvenience.—(*Journal de Méd. et de Chir. prat.*, June 10, 1915.)

TREATMENT OF DIARRHŒA.

Severe diarrhœa is a common complaint at the Front in hot weather, and in many cases disables a man for some days. Paul Lehmann, after trying various drugs, found that by far the best results were obtained by giving ipecacuanha. He gives from 80 c.g. to 1 g. in the day divided into 5 or 6 packets of 0'20 g. each. One of these is taken every two hours in a hot infusion, tea or tilia. For that day milk is forbidden, and the patient takes nothing but liquid (tea, etc.). He takes food the following day, but is

not allowed meat. The diarrhœa has always stopped by the second day. The ipecacuanha is very well tolerated, as a rule; it often causes some nausea, but very seldom vomiting. Since using this treatment, he has never had to send a man back to lie up. After standing off duty for a day, he returns the next day, and resumes his ordinary food soon afterwards.—(*Journ. des Praticiens*, July 17, 1915.)

SPARTEINE.

Petty considers that the differences of opinion, with regard to the value of this drug, are due to not knowing the proper dose, which is by some taken to be from $\frac{1}{10}$ th to 2 grains, and by others $\frac{1}{3}$ th of a grain or less. He regards fractional doses as useless, but that doses of from one to two grains will have a good effect both as a cardiac tonic and a diuretic. The tonic effect on the heart is as great as that of digitalis, but the latter is a vaso-constrictor whereas sparteine is a vaso-dilator. According to Petty, doses of two grains are not toxic, and may be given every four or six hours to keep up the full effect of adding tone to the heart's muscle, increasing the force of its action, and at the same time, by dilating the arterial capillaries, reducing the resistance to be overcome.—(*New York Medical Journal*, April 3, 1915.)

THE OPEN TREATMENT OF INFECTIOUS WOUNDS.

Dyas, of Chicago, in a preliminary report, speaks warmly in favour of this method of treatment in all degrees of burns, and in old suppurating wounds. Three cases of old-standing varicose ulcers on the leg are briefly reported, in which complete healing over was obtained in from two to three weeks. The patient is put to bed, and a cradle is placed over the limb, across which is thrown a piece of mosquito netting, to keep off flies and to prevent bits of dry crusts flying in the air. In some cases a current of air from a small electric fan was directed on to the raw surface for about half-an-hour four or five times a day. The discharge very quickly gets less, and all fœtor disappears. Patients object at first, but after two or three days they can see the improvement taking place and are very glad to be relieved of the painful dressing each day and the discomfort of pus-soaked bandages. Large crusts of inspissated serum pus, and epithelial and connective tissue elements are frequently shed, leaving a clean granulating surface. The swelling and œdema subside, and there is no pain. The only attention required is the occasional raising of crusts to allow pus or serum to escape from beneath, and the irrigation of some stubborn area. In some cases, an inert desiccating powder was used, which forms a solid coating with the desiccated tissues and serum.

Dyas considers that the treatment of suppurating areas by voluminous dressings, sterile or antiseptic, macerates and devitalizes the tissues, fosters the development of pathogenic flora, and does not assist in the repair of the tissues. As it always is an advantage to convert a moist into a dry type of gangrene, the desiccating influence of the air upon the wound, in the absence of any moist covering, tends to attenuate infecting organisms. The method is safe and economical to a degree. The patient's period of convalescence is much shortened, and he suffers no pain. In Dyas's experience, there is no

danger of contamination from the air.—(*Journ. Amer. Med. Assoc.*, May 29, 1915.

INFANTILE ASTHMA.

Asthma, in children, may be febrile, and simulate capillary bronchitis, or broncho-pneumonia. Its sudden onset and the knowledge of previous attacks give an inkling of the real state of affairs. The afebrile form must be distinguished from a foreign body, laryngismus stridulus, spasm or œdema of the glottis, and croup. The reflex causes of asthma are: hay-fever, adenoid growths, enlarged tracheal and bronchial glands, dyspnoea due to the thymus, uræmia, intestinal auto-intoxication, and heart disease. This series must be eliminated before it can be said that an attack of true asthma is present; that is to say, a neurosis of arthritic origin, which is provoked in the peripheral nerves, by a blood infection, or by psychic influence. The treatment should comprehend both the fits and intercalary periods.

1. *Treatment of the fit.*—For an inhalation, Cornby recommends the following mixture, which is burnt on a red-hot shovel, placed near the child:—

Powdered stramonium leaves.					
Powdered belladonna leaves	-	-	-	-	of each 10 gram.
Nitrate of potash	-	-	-	-	2 gram.
Powdered opium	-	-	-	-	0.50 gram.

Spraying out the room has been advised, for which the following is ordered:—

Solution of adrenalin hydrochloride (1 per mil.)	-	10 g.
Gomenol	-	10 g.
Liquid paraffin	-	20 g.

Pyridine—2 or 3 g. in a saucer, or a few drops on a handkerchief for inhaling—does not give so much relief as the stramonium leaves preparation, given above.

For the rigor, an hypodermic injection of from 1 to 2 m.g. of morphia should be given.

An emetic is often useful; for this, a teaspoonful of the following should be given every five minutes until vomiting occurs:—

Powdered ipecacuanha	-	-	-	-	0.30 g.
Syrup of ipecacuanha	-	-	-	-	30 g.

The chest should be surrounded by mustard poultices, kept applied for between 10 and 15 minutes, or better, by a mustard-pack, as recommended by Méry. For the latter, 500 g. of flour of mustard are stirred up in 1 litre of hot water, or if there is any fever, water at 20° C. A cloth is soaked in this, wrung out, and wrapped round the chest. It is then covered with dry flannel and oiled silk, and left in place for a quarter-of-an-hour.

If the bronchi are very much clogged, Bose orders the following draught to be taken after the emetic:—

Sodium Benzoate	-	-	-	-	3 g.
Ipecacuanha Root	-	-	-	-	0.15 g.
(infused in 100 c.c. of water.)					
Syrup of Belladonna	-	-	-	-	15 c.c.
Tincture of Lobelia	-	-	-	-	2 c.c.
Julep	-	-	-	-	to 150 c.c.

P P

"One or two tea-spoonfuls to be taken every two hours."

For food, hot milk and water is given, and constipation must be relieved by an enema.

2. *Treatment between the Attacks.*—Iodide of potash is given for three weeks.

Potassium Iodide	-	-	-	-	2.50 g.
Syrup of Orange-peel	-	-	-	-	250 c.c.

One tea-spoonful, containing 5 c.g. of iodide, at meals in early childhood, and a dessert-spoonful for older children.

After a fortnight's interval, another three weeks' course is given. During the interval, arsenic is given.

Sodium Arseniate	-	-	-	-	0.02 g.
Distilled water	-	-	-	-	200 c.c.

One tea-spoonful ($\frac{1}{2}$ m.g.) at the mid-day meal and in the evening, increasing to two tea-spoonfuls.

More delicate children may be given iodo-tannic syrup, one tea-spoonful before meals, or injections of cacodylate of soda ($\frac{1}{2}$ to 1 c.g.).

Three drops of the 1.0% solution of adrenaline hydrochloride, taken by the mouth, are used as a prophylactic against the fits, while for the same purpose Revilliod recommends the injection of 10 c.c. of diphtheria antitoxin.—(*Journ. des Praticiens*, June 12, 1915.)

TREATMENT OF SUMMER DIARRHŒA OF CHILDREN.

Girou, of Toulouse, reports from Prof. Bézy's Clinique, successful results in the treatment of the summer diarrhœa of children by hordenine sulphate. The method adopted is to place the child for from 24 to 48 hours on water or glucose-water; if vomiting is frequent, the stomach is washed out, and if the stools are very foetid, the bowel is washed out with collargol. A purgative in the shape of calomel or castor oil is given, followed by an intestinal antiseptic, such as lactic acid, betol, or tannigen. The general condition is stimulated by baths, friction to the surface, and, above all, by hypodermic injections of 10 c.c. of normal saline, to remedy the dehydration of the tissues. If the diarrhœa continues in spite of this treatment, sulphate of hordenine is given either by the mouth, by the bowel in large injections, or by hypodermic injection, the best effects being obtained by the last. A series of observations carried out by Tomey proved that this alkaloid is able, through its action on the nervous system and on the secretions, to check the diarrhœa, and, by its bactericidal properties, to destroy the intestinal microbial growth. The diarrhœa stops almost suddenly after the first or second injection.

The dose is given according to the age of the patient. A sterilized syringe, 1 c.c., graduated in one-tenths, is filled from an ampoule, this amount containing 25 centigrammes of hordenine. The child is given one division for each month of life, but the minimum dose given, even at one month, is three divisions. Practically, these amounts can be slightly increased, but the action of the drug on the medulla must always be borne in mind. Vomiting, dyspnœa, cyanosis, and a few convulsions sometimes follow an injection. These effects are transient and not dangerous, but it is wise to warn the parents beforehand. More than 100 cases have been treated with this drug with good results and with no after-effects to cause the least anxiety.—(*Journ. des Praticiens*, June 19, 1915.)

Reviews of Books.

Diseases of the Skin. By JAMES H. SEQUEIRA, M.D., F.R.C.P., F.R.C.S.
Second Edition. Pp. 650. London: J. and A. Churchill. 25s. net.

THE second edition of Dr. Sequeira's text-book has been enhanced by the addition of four new coloured plates, representing a feigned eruption on the right breast of a hysterical girl, a punched-out gummatous syphilitic ulcer on the back, a widely distributed eruption of urticaria pigmentosa, and a hand affected with pityriasis rubra pilaris. Of these, the last is the least realistic, and, except for the distribution on the back of the fingers, it would be a matter of some difficulty to recognize the disease from the illustration, the colour being much more that of a seborrhœic dermatitis than the disease which it represents. A large number of new figures have been added to the text. These vary in merit, but a number of them are excellent, such as those illustrating erythema abigne, ringworm of the nails, circinate papular syphilide on the face, terminal necrosis of the phalanges in Raynaud's disease, and tricho-epithelioma. A series of micro-photographs have been introduced to illustrate the histological appearances of the lesions.

The letterpress has been amplified by the addition of references to various forms of dermatitis, which have recently attracted attention. Grain-itch due to the pediculoides ventricosus is described, reference being made to an epidemic of it which occurred in London among men unloading cargoes of cotton seeds. In connection with tropical dermatology, the dermatitis of the feet caused by the entrance of the hook-worm and the so-called "Calabar swellings" caused by the filaria Loa are mentioned.

The book has been brought well up to date, and can be strongly recommended both to student and practitioner as a reliable, concise, and well illustrated text-book.

Mentally Defective Children. By ALFRED BINET and TH. SIMON, M.D.
Authorised Translation by W. B. DRUMMOND, M.B., C.M., F.R.C.P.
Pp. 180. London: Edwin Arnold. 2s. 6d. net.

THE works of Binet and Simon, on the methods of investigating the ability of backward children, are well-known, and special interest attaches to them in these days, when the importance of the subject is being more fully recognized.

Professor Alexander Darroch has written a few pages of introduction, in which he points out that the object of the Binet-Simon tests is mainly "to furnish to the teacher a first means by which he may single out mentally backward children, who, upon further examination, may also be found to have some mental defect or peculiarity which prevents them from fully profiting by the education of the ordinary school, and who probably would benefit more by being educated in a special school or in a special class."

Everyone knows the importance of teaching a child according to its

standard of intelligence and not according to its age, and among the useful information given in the chapter on "pedagogical examination of children," instructions will be found for the guidance of teachers in making their selections. There is as well, among others, an important chapter concerning the medical examination of defectives, from which much practical instruction may be derived.

Binet-Simon tests are described in an appendix, and the book will be found both interesting and useful to all who are interested in this important class of work.

Mechano-therapeutics in General Practice. By G. DE SWIETECHOWSKI, M.D., M.R.C.S. Illustrated. Pp. 141. London: H. K. Lewis. 4s. net.

THIS compact work has been divided by the author into sections labelled surgical, medical and special; and a glance at the list of contents or at the admirable index, suggests that the object indicated in the preface—that of furnishing a reliable guide as to what conditions may be treated by mechano-therapy—is adequately fulfilled.

The indications given of the methods of treatment, that may properly be employed, are, it must be admitted, less convincing. Thus, in the chapter dealing with the treatment of fractures, we find bloodless surgery advocated at length for the treatment of transverse fractures of the patella; despite the fact that we have Lucas-Championnière's authority for holding that these fractures should be submitted to open operation wherever possible. Since, ostensibly, the French master's teaching is adopted, we make no excuse for protesting against the introduction of many minor, but in our view highly mischievous, modifications of his technique for the treatment of recent injuries.

The chapters devoted to the consideration of chronic surgical complaints are more reliable—the best is that dealing with deformities—and the 50 pages reserved for the study of medical ailments are certainly made the most of, though an epitome only of the subject can find room within these limits. We are given a general guide which is of real value, though not including the detailed information necessary to a practitioner who has to distinguish between cases which are favourable for the treatment and those which are not; and who must, in dealing with more difficult conditions, decide with precision when treatment must begin or when it must be withheld. The illustrations are admirably clear and intelligible.

Abdominal Surgery for Students and Physicians: Clinical Lectures. By Professor THORKILD ROUSING. Edited by Paul Monroe Pilcher, M.D. Pp. 471. London: The J. B. Lippincott Company. 21s. net.

GREAT pleasure and much valuable information will fall to the lot of those who peruse the pages of this work, which is the outcome of the great experience and exceptional ability of the great Danish master of surgery. The thanks of the profession are justly due to Dr. Pilcher, whose labours have placed at the disposal of English-speaking surgeons the teaching of Professor Rousing.

The work consists of a series of clinical lectures, the lucidity and fruitfulness of which would be difficult to excel.

Beginning with a number of valuable hints and suggestions to be

remembered when investigating and forming a diagnosis, among which grave warning is given against indiscriminately excising portions of growth for microscopic examination, and lightly embarking upon exploratory operations, the author proceeds to discuss the development of antiseptic methods, and pays grateful tribute to Lord Lister and M. Pasteur. He strongly condemns iodoform, and advocates preparations of silver nitrate for irrigation, for impregnating gauzes, and for preparing catgut.

Lecturing on anæsthetics, he expresses preference for ether by Wauscher's apparatus, advises local endermic injection in certain regions, but emphatically condemns spinal anæsthesia.

In a case of a bolus of food becoming impacted in the œsophagus, he advises its being pushed onwards with a probang tipped with a blunt ivory tip of large calibre. We think this advice is open to criticism when treatment by Killian's and Brünings's direct method can possibly be adopted, for the bolus may contain jagged bone, etc.

One of the most interesting lectures is that dealing with the diagnosis of gastric disease, in which it is shown how symptoms of affections of remote organs may be attributed to the stomach. It explains as well how the use of the author's gastroscope, employed during laparotomy, gives great assistance by illuminating the cavity of the stomach, and thus allowing changes in the walls of that organ to be observed by transmitted light, as well as permitting examination of its mucous lining through the telescope of the instrument, and, further, assists in the retrograde passage of œsophageal bougies through strictures low down in the gullet. The lectures on gastroptosis will be a revelation to many, and should be studied by all.

Very valuable lectures deal with ulceration of the stomach of different types and their treatment, and others with tuberculosis of that organ, and with the diagnostic confusion produced by appendicular disease. All the other lectures are quite excellent and read most pleasantly, though we think the wording of the first part of the last paragraph on page 179 needs revision.

The printing is extremely good, and the illustrations admirable. We unhesitatingly recommend this work to all members of the profession who have to deal with diseases of the alimentary canal.

A Surgical Handbook for the Use of Students, Practitioners, House-Surgeons, and Dressers. By FRANCIS M. CAIRD, M.B., F.R.C.S., and CHARLES W. CATHCART, M.B., F.R.C.S., with 208 illustrations. Sixteenth Edition. Pp. 353. London: C. Griffin & Co., Ltd. 8s. 6d. net.

THE very fact that this handy and elegant little volume has now reached its sixteenth edition, gives it a character for faithful and valuable service, and such it truly merits.

It contains an enormous amount of information, dealing with subjects that may be familiar to many, though sometimes forgotten. At the same time, there are many details of modern technique, which might be difficult to obtain if required in emergency, but are ready to hand. As examples of this, we may mention details of suture for blood vessels, apparatus for syphoning away urine after suprapubic cystotomy, Schäfer's artificial respiration, etc.

The newer methods of treating fractures and dislocations, in which long

immobile retention in splints is avoided, and early manipulation and massage employed, are described. Splints and bandages are described and illustrated. Clinical examination of the urine, treatment of poisoning, making of plaster cases, preparing catgut and other sutures, use of special instruments, microscopical examination of discharges, lists of instruments for operations, tuberculin tests and uses of antitoxins, are some of the innumerable articles contained in this little book.

We are convinced that there are but few members of the profession, who will not, at some time or another, desire handy access to some piece of practical information that has perhaps slipped from his memory. In all probability, he will find it somewhere within these pages, and, by means of the index and table of contents, be able to turn it up readily, if he be so fortunate as to possess this excellent little work, which we cordially recommend to all those for whose guidance it has been written.

The Heart in Early Life. By G. A. SUTHERLAND, M.D, F.R.C.P. Pp. 207. Illustrations 50. London: Oxford Medical Publications. 6s. net.

To the formation of the Society for the Study of Disease in Children in 1900, now a special section of the Royal Society of Medicine, and to the vigour which has always characterized its discussions, may in no small measure ascribed the growing interest in disease, as seen in children. It is now recognized that children are not merely small editions of their elders, but that they are liable to diseases peculiarly their own. Moreover, in affections more or less common to all periods of life, a marked difference is often seen in young patients. As a consequence, the literature of children's diseases has grown of late, even in special departments of which the volume before us is a notable example.

The earlier chapters are devoted to the consideration of functional cardiac disturbances, and the author contends that cardiac irregularity has, as a rule, no pathological significance in children, and polygraphic tracings are given to show that it is respiratory in origin. The chapters on rapid and slow action of the heart will be found very helpful. On the subject of dilatation of the heart, the writer contends that it is seen in nervous children and in acute pyrexial disease, and he fails to see "why dilatation in rheumatic carditis should be emphasized so strongly." Here is surely room for difference in opinion. Considerable doubt is cast on the reliability of percussion in determining the left border of the heart. This does not, however, accord with the experience of many notable clinicians. In discussing murmurs, the writer properly insists on the paramount importance of the condition of the myocardium, especially that of the left ventricle, and that diagnosis and prognosis are based on the existence of murmurs.

Chapter 20 deals with the subjective symptoms in cardiac disease. It should be of much assistance to school doctors, in cases of palpitation and faintness in growing children, when called upon to decide the amount and kind of exercise the patient should be permitted. Treatment is more fully gone into than is usual, while with reference to the use of digitalis the author favours the tonic action of the drug on the myocardium as an explanation of its beneficial effects.

The book bears throughout the stamp of experience, founded on

clinical observation, which is of itself a strong recommendation. The index is, however, not sufficiently complete for ready reference, and we fail to see the object of a fresh alphabetical arrangement following "Treatment" on the last page.

Cane Sugar in Heart Disease. By ARTHUR GOULSTON, M.A., M.D. Demy Octavo. Pp. 115. London: Baillière, Tindall and Cox. 5s. net.

THE contention of the author is that valvular disease *per se* does not give trouble, if the myocardium is well nourished, and that heart failure with its consequences is chiefly due to malnutrition of the musculature of the heart, which "in a very large proportion of cases, takes the form of a lack of dextrose and levulose for the formation of that store of glycogen in the musculature of the heart, which is absolutely necessary to it for the proper performance of its function." A sharp distinction is drawn between West Indian cane sugar and that derived from other sources, the former only possessing special therapeutic value. What the special "activator" alone existing in cane sugar may be, is still an open question, but that such a property exists, though "it still eludes discovery is shown by the dire effect on bees when their winter food is made from beet sugar, while they flourish on syrup made from cane sugar." Under *treatment* a warning is given against the use of "Guy's" pill, and it is suggested that the frequency of bad teeth in heart disease is caused by the mercury contained in this pill. The combination of drugs in the Guy's pill is of such proved value, that it would be a pity to discredit it on insufficient grounds. We would rather consider that caries of the teeth in chronic heart disease is caused by the malnutrition common to all chronic affections. As regards the use of alcohol, we still give the palm to brandy, on the rare occasions when a stimulant is required, on account of the ethers therein contained. The author has found lemon juice harmful during cane sugar medication; this, though difficult to understand, is a conclusion doubtless founded on experience.

Several illustrative cases are given with tracings, and, although drugs and the usual therapeutic measure were called into requisition in most of them, the author claims that the cane sugar at any rate aided considerably in the recovery of the patients. Clinical results following any special treatment, though at times not easy of explanation, may be none the less real.

Through the book runs the thread of an honest desire to obtain the truth regarding the value of the treatment advocated, and on this ground, among others, we recommend it. It is a pity there is no index.

The Commoner Diseases: Their Causes and Effects. By Dr. LEONHARD JORES. Authorized English Translation by WILLIAM H. WOGLOM, M.D. Pp. 424, with 250 figures in the text. London: The J. B. Lippincott Company. 16s. net.

THESE lectures were published primarily as an aid to Dr. Jores's pupils, and to them the lectures were doubtless exceedingly interesting and useful; but in view of the enormous output of works on pathology, it seems to us uncertain whether they will fulfil the hope of the author by commending

themselves to the practitioner as well.

The author has not confined himself, as the title of the book would indicate, to the commoner diseases, for in the account he gives of chloroma he designates it "This extremely rare disease."

The work differs from the ordinary run of books on pathology, inasmuch as the author takes a disease, describes its morbid anatomy, and gives an account of its sequelæ and more usual complications, the post-mortem findings being combined in this way into a coherent whole. Take, for example, the account given of scarlet fever. The author starts by saying that if death takes place during the first few days of the attack, it must be assumed that death was due to the toxin of the disease. In these cases, the findings at the necropsy are negative. In the later stages, he points out that the principal lesions are discovered in the upper respiratory passages. These are then described, as well as the post-mortem findings in scarlatinal sepsis, and the changes met with in the kidneys and heart. By this means a clear view is obtained of the effect of poison of scarlet fever upon the whole system. The illustrations are mostly reproductions from photographs, and they may therefore be relied upon as a true picture of the morbid appearances met with. The bibliography occupies nine closely printed pages with about 100 references on each page, and we have discovered less than 15 references to American and British Medicine. The book must, therefore, be regarded as representing almost exclusively the German view of pathology.

Text-Book of Massage and Remedial Exercises. By L. L. DESPARD. Pp. 413. Illustrated. London: Henry Frowde and Hodder and Stoughton. 12s. 6d. net.

DURING four years, the first edition of Miss Despard's work has been to many massage students what Cunningham's Practical Anatomy has been to the student of medicine. The comparison is the more obvious in that the illustrations in Part I., which deals solely with anatomy, are borrowed from Cunningham's text-book. Nothing more need be said to express their perfection. In the interest of future editions, we would offer two criticisms on this part of the book. Much detail is provided which, though valuable in itself, is not essential to the masseuse. The printing of some less essential parts in smaller type would, we think, greatly aid the student. Second, lists of muscles which perform various movements are given in tabular form, but sufficient care has not been exercised to emphasize their relative importance; this drawback is accentuated by variations of order in some lists, which are in substance no more than repetitions.

Part II. presents an accurate account of every branch of the art of massage, and the description of its application to each variety of injury or disease is admirably complete, though concise. A new chapter on Remedial Gymnastics (in tabular form) has been added, and this, together with the new tables of exercises applicable to various conditions, much enhances the value of the work. The chapter entitled "Electrical Methods" will be found to contain all essentials, and the short bibliography appended to most sections of the book is invaluable.

Medical men who wish to supervise intelligently the work of their

massage-nurse, or to prescribe or regulate treatment, will discover in Miss Despard a trustworthy guide.

Scheme for dealing with Tuberculous Persons in the County of London. By D. BARTY KING, M.D., with a foreword by Sir WILLIAM OSLER, M.D., F.R.S. 4to. Pp. 54, with charts. London: Bale, Sons and Danielsson. 5s. net.

IN this book, Dr. Barty King has drawn up a most elaborate scheme for the comprehensive solution for all the medical, economic, and social problems raised by infection with tubercle bacilli in human beings. He would place the campaign against tuberculosis under the care of a Governmental Department, itself under the wing of a Ministry of Public Health. The organization recommended is first class in its thoroughness and in the extent of its routine. Charts are given at the end of the book to help in elucidating the solution of the problems raised; they recall plans of the labyrinth at Knossos, far outstripping the worst figures in Euclid, and should have been executed in colours, not in black and white, to be of any practical service. The author notes that a scheme for dealing with tuberculosis in the County of London has already been passed by the London County Council, and at the end of his volume he makes a number of useful criticisms of this scheme. So technical a work as this can hardly expect to attract many readers; it should certainly be in the hands of our medico-social legislators.

The Inevitable Complement: the Care and After-Care of Consumptives. By H. VALLOW, M.D. Cr. 8vo. Pp. 66. London: Bale, Sons and Danielsson. 1s. 6d. net.

DR. VALLOW has written this excellent little book to assist members of insurance committees, medical officers of health, tuberculosis officers, and their numerous voluntary helpers, in the campaign against consumption. Great emphasis is laid upon the importance of following the phthisical patients up after they have had their sanatorium or dispensary treatment, or, as he puts it, upon the importance of bringing the sanatorium to the home; for, as he points out, it is the home that is at the present time the weak point in the chain of treatment of consumption. He holds that Care and After-Care Committees should be formed of voluntary rather than salaried municipal workers, but that they should be subsidized by the local or central authority. Excellent practical advice is given as to how such Committees should perform their duties, as well as to the kinds of work best fitted for consumptive patients who are partially or completely cured. The volume is clearly written, and certainly supplies a long-felt want. It may be warmly recommended to all medical men and laymen who have to deal with the social or economic aspects of pulmonary tuberculosis.

Text-Book of Public Health. By Professor E. W. HOPE, M.D., D.Sc. Pp. 267. Edinburgh: E. and S. Livingstone. 5s. net.

THE author's reputation and high standing in the public health service are a sufficient guarantee that this recently published text-book of public health will attain the object desired, viz., to meet the requirements of the

medical student or the practitioner reading for the diploma in public health in as simple and useful a manner as possible. After reading through the book, we are in a position to state that this guarantee has been fulfilled, the simple and useful manner in which the various subjects are set forth being specially noteworthy—no mean praise, having regard to the large number of text-books already published on the subject of public health. The headings of the subject (12 chapters in all) have been well chosen and follow one upon the other in happy sequence, *e.g.*, site and soil, construction and sanitation of buildings, sewerage and disposal of sewage, water, air and ventilation and warming, meteorology, vital statistics, zymotic diseases and hospitals, food and clothing, school hygiene, military and marine hygiene, sanitary law. The important facts are set out clearly, without useless padding, and the language in which they are set out leads the readers on quickly from page to page, leaving them interested in the various problems dealt with, and being calculated to cause them to continue the study of such problems in the well-known published books on the subjects. It must not be forgotten that the text-book is published for the purpose of giving a general simple outline of the problems of public health, and does not profess to deal exhaustively with them.

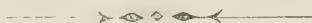
The diagrams and illustrations are excellent, especially the illustrations showing smallpox in its modified and unmodified forms. The only objection we have to offer is that they are not sufficient in number—an objection that can readily be got over in future editions.

A good index accompanies the book.

Feeble-Mindedness. Its Causes and Consequences. By HENRY HERBERT GODDARD, Ph.D. Pp. 559. London: The Macmillan Company. 17s. net.

THIS work will be of value to those who take interest in the great social problem of feeble-mindedness. It is, as the author tells us in his preface, "in the nature of a report on work done at the Vineland Research Laboratory during the past five years in an attempt to discover the causes of the feeble-mindedness of the children in the Institution."

Charts of 327 families are given, and are divided into six main groups according to the apparent origin of the mental enfeeblement. Such an analysis has of course entailed an enormous amount of work both on the part of the "field workers," who have investigated the family histories, and of those who have undertaken the testing of the mental abilities of the patients. Those who are following this line of work should find the book both helpful and instructive.



CORRECTION.

In the article published in the August issue of THE PRACTITIONER ON *The Treatment of Fibroids by X-rays* by Mr. F. L. Provis, conclusion number four should read: "That, with few exceptions, Röntgen therapy should *not* be recommended in women under 39 years of age."

Preparations, Inventions, etc.

VIYELLA.

(London: Messrs. Wm. Hollins & Co., Ltd., Newgate Street, E.C.)

The principle on which the manufacture of this fabric is based is the counteraction of the shrinkage in washing by the combination of a small, but standardized, proportion of suitable cotton with the wool. This is done before spinning the yarn of which the fabric is woven. We have tested Viyella and find that the manufacturers' claims for it are justified, for they have produced a light, soft, durable, and unshrinkable cloth. It possesses a distinct hygienic value inasmuch as the proportions of wool and cotton are standardized, and the material is consequently reliable. A variety of "weights" (all in the one quality) has been produced, varying from the very light, suitable for tropical wear, to a heavy cloth. In addition to the material suitable for shirts, hosiery, and underwear, a special weave for sheets, pillow-cases, etc., is made.

CYTO-SERUM.

(London: Messrs. Bresillon & Co., Gamage Buildings, Holborn, E.C.)

This preparation contains cacodylate of soda in high doses, which have been proved to be the most effective method of giving this drug, for they are well tolerated and quite free from any ill effects. The preparation was originally introduced under the name of *serum cytophile intensif*. It has the following composition:—

Anhydrous alkaline cacodylate	-	-	0·3 grm.
Sulphate of strychnine -	-	-	0·001 grm.
Special isotonic serum -	-	-	to 5·0 cc.

The advantages claimed are: the importance of the isotonic principle in hypodermic medication; the injection is painless at the time and afterwards; and the solution will keep indefinitely in the ampoules. The addition of 1 mg. of strychnine increases the appetite and the general tonic effect. The cacodylates used in this preparation are chemically pure and anhydrous; the amount of arsenic contained, therefore, does not vary, and there is no excess of alkali or of free cacodylic acid. The serum serving as the vehicle has been thought out carefully, so as to ensure quick absorption of the active principles in the solution. A glass syringe with a 3 cm. needle is recommended for use, and the injection should be made into the gluteal region behind the trochanter. One ampoule should be given every other day, until six have been injected; after this, one, or even a double dose, may be given every day. It is advised that the injection should be given in the morning, in order to avoid causing insomnia.

The intensive treatment by cacodylate of soda has been found of great service in anæmia, chlorosis, Graves's disease, neurasthenia, rickets, diabetes, when the patient is well nourished and has normal intestinal functions, certain dry dermatoses, such as psoriasis, lichen, and eczema, and for badly developed children and convalescents, as well as its specific use in

syphilis, trypanosomiasis, and malarial cachexia.

It is put up in ampoules of 3 cc. for adults, and of 2 cc. for children up to 10 years.

MERCURIALIZED SERUM.

(Philadelphia, U.S.A.: H. K. Mulford Company.)

This preparation is made according to Dr. C. M. Byrnes's directions for use in his method of treating cerebro-spinal syphilis by intra-dural administrations of mercurialized serum, as explained in his paper in the *Journal of the American Medical Association*, 1914, lxiii, 2, 182. It is put up in two strengths. No. 1 contains the equivalent of 1.3 mg. ($\frac{1}{50}$ gr.) of mercury chloride in human serum, diluted with normal saline to a total volume of 30 cc. No. 2 contains the equivalent of 2.6 mg. ($\frac{1}{25}$ gr.) of chloride of mercury in human serum, diluted with normal saline to a volume of 30 cc. Both solutions are dispensed in sealed ampoules, with sterile intra-spinal needle and tubing ready for intra-dural administration. The interval between injections should be from 7 to 14 days, and the treatment should be continued until the cell-count and amount of globulin present in the cerebro-spinal fluid have become normal. The treatment is begun with the No. 1 serum, going on with No. 2 after two or three doses have been given or when tolerance is well marked.

LUETIN.

(Philadelphia, U.S.A.: H. K. Mulford Company.)

Luetin is an extract of the killed cultures of several strains of the *Treponema pallidum* (*Spirochæta pallida*). The spirochætes are killed by heating to 60° C., and 0.5 per cent. of trikresol is added as a preservative. The amount injected for one test is 0.07 cc., and the injection is made into and not under the skin. A small bleb is produced, which disappears in a short time. There are various types of positive reactions. The papular, in which a positive reaction is shown by a large reddish papule, which appears in from 24 to 48 hours, and gets larger and more indurated during the next four or five days. The colour gradually becomes a dark-brownish red, and the induration passes off in the course of a fortnight. A pustular result sometimes appears; the papule about the fourth or fifth day being converted into a vesicle, in which the serum later becomes purulent. The reaction is occasionally delayed for 10 days or longer, when pustular changes set in after a negative result has apparently been obtained. The test is specific for syphilis, and occurs most constantly during the tertiary and latent stages. It is supplied in intra-dermic syringes for single tests, and in ampoules.

THE SCHICK TEST IN DIPHTHERIA.

(Philadelphia, U.S.A.: H. K. Mulford Company.)

When a small quantity of diphtheria toxin is injected into the skin, a positive reaction occurs in from 24 to 48 hours in those who are susceptible to diphtheria, and therefore likely to be attacked. The reaction is shown by a circumscribed area of redness and infiltration around the site of the intra-dermal injection, from 1 to 2 c.m. in diameter. It is possible in this way to separate the non-susceptible from the susceptible in those exposed to infection. The diphtheria toxin, in amount $\frac{1}{50}$ th of the minimum lethal dose for a guinea-pig, is supplied for the test in intra-dermic syringes for single tests, and in packages containing 5 tests.

THE PRACTITIONER.

NOVEMBER, 1915.

AN APPEAL FOR THE MORE EXTENDED USE OF WHOLE MILK IN THE ARTIFICIAL FEEDING OF INFANTS.

By C. WILFRED VINING, M.D., M.R.C.P., D.P.H.

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WE have reached a stage in the history of preventive medicine, when definite steps are being taken by municipal and voluntary bodies to tackle the problem of infant mortality. Much vigorous and valuable effort is being expended in many of our cities in the organization of Babies' Welcomes, and such like institutions, to help the poorer mothers in the rearing of their children during the early months of life.

The question of a right method of feeding, therefore, looms large, and it is only natural and correct that the people should look to the profession for a proper standard of action to follow—a standard which should pass the tests of efficiency and practicability. Is the profession giving them this standard?

The distressing amount of rickets still prevalent in this country is in itself sufficient to indicate that something is wrong somewhere, and while it may be argued that wrong feeding is not the whole story in its causation, yet I think few will be willing to quarrel with the statement that the avoidance of rickets lies to a great extent in a right method of feeding. Babies do develop rickets when breast-fed, but breast-feeding is not necessarily always efficient, and on the whole it may fairly be stated that in rickets we have a good measure of the inefficiency of the feeding process.

The subject of infant feeding is one with which the medical student rarely comes into close contact. When the time of practice is reached, he turns instinctively to the books for help, and not infrequently to the booklets and pamphlets which descend upon him from the only too numerous manu-

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facturers of artificial foods.

The books are rarely satisfactory. All of them deal very fully with the subject, and in them are arrayed in confusing detail the numerous milk modifications and feeding schemes that have from time to time proved successful. Few of us have the time or patience to wade through this multitude of detail, but should we do so we almost invariably find that *the* method advised, as the alternative to breast-feeding, is that of feeding with modified cow's milk—milk first diluted and then enriched with cream and sugar.

With this method no one will quarrel as regards its efficiency, whatever one may wish to say as regards its necessity or practicability; but unfortunately this model method of the books is quite out of the question with the poorer classes of the community. Yet it is this very ideal from which has sprung that most unfortunate and inefficient of all methods, namely, the hopeless dilution of what is frequently an already diluted milk, with no subsequent addition of fat, but often with an excessive addition of a quantity of cheap sugar, which is not infrequently the cause of additional digestive disturbances. Even for the more fortunate classes this modified milk method is complicated, worrying, meddlesome, and requires constant skilled supervision. The frequency with which barley water is used as a diluent has led to a total eclipse in the comparative value of the barley and the milk in the eyes of the mother. It is often the barley which is the food, the milk being merely an addition. To feed a baby during the first six months of life with milk diluted even to half its strength, to say nothing of any dilution through which it may have passed before delivery to the consumer, is going a long way, perhaps the whole way, towards laying the foundation of a rickety constitution.

The other source of information, namely, the free advice and directions sent out with the proprietary foods, is usually clear, to the point, and easy to apply. What is more, the results obtained are frequently successful as regards the child's weight; and it is wonderful how we still continue to bow the head to the idol of the weight chart, in preference to all other measurements of the child's progress.

The unsatisfactory state in which the subject stands at present,

together with a settled conviction of the efficacy of whole milk, has stimulated me to ask those who have not already done so, to try whole milk feeding as a routine measure in all cases in which the natural supply is in abeyance. In support of the assertion that such a method of feeding is possible, simple, and productive of the best results, it will be of value to consider briefly some of the arguments usually put forward against it.

Argument 1.—Whole milk is an unsuitable food; most babies cannot take it, and indeed ought not to be given it.

This brings us immediately to a critical comparison between human and cow's milk. The result of that comparison may be stated thus: the total solids and the fat are about the same; of the total solids, the carbohydrate lactose is about 10 per cent. less in cow's milk, while the protein, made up of caseinogen and lactalbumen, is something less than 10 per cent. more plentiful. We may therefore ask, whether this supposed inability on the part of the baby to take whole milk is due to—

- (1) a difficulty in digesting a milk containing a higher protein content than that found in human milk;
or
- (2) a purely mechanical difficulty in dealing with the tough firm clot into which the casein of cow's milk is changed by the action of the gastric juice; or
- (3) a qualitative difficulty, by which the child finds the constituents of cow's milk more difficult to metabolize.

It has been taken for granted by the profession in the past, that the excess of protein, in the form of caseinogen, is the great stumbling block of feeding with cow's milk; to get over this difficulty, a dilution of the milk has always been insisted upon. From this has gradually been evolved, in the public mind, the now fixed belief that cow's milk is a far richer and more concentrated food, bulk for bulk, than human milk. Hence arose the importance of the diluting process in the eyes of the mother. Now, cow's milk is only more concentrated in the protein sense, the caseinogen of the protein being more plentiful than in human milk, making up, as it were,

for the lack of carbohydrate; the proportionate change results, however, in no increase in total solids.

The question is, therefore, not whether a baby can digest a milk containing a higher degree of total solids, but rather whether it can deal with the higher proportion of protein with its greater casein percentage. It has been demonstrated by Finkelstein,¹ Heim and John,² Bowditch and Bosworth,³ Neff,⁴ Willcox and Hill,⁵ and Abt⁶ that it is possible to feed infants with a milk mixture containing an amount of casein far in excess of even that in cow's milk. Their experiments have been carried out upon babies suffering with severe digestive disorders, their theory being that the fat is frequently at fault and not the protein. While this evidence is not put forward to prove that a baby's food should contain a higher protein content, yet it is important in that it shows that the difficulty in cow's milk feeding is not necessarily due to excess of protein. That being so, it behoves the profession to reconsider its former judgement made in favour of diluting.

Where, then, lies the difficulty? The answer will be found, when the possibility of its being mechanical is considered. There can be no doubt that babies do find a difficulty in dealing with raw whole milk, but, on the other hand, it has been proved time and again that when whole milk has been subjected to prolonged heating or has had sodium citrate added to it, the difficulty disappears. Professor Budin,⁷ in his book *The Nursling*, which has been translated into English by Maloney, tells us that for many years he has used sterilized whole milk as a routine measure of feeding, the heating to 110° preventing the clot formation, and the result being similar in this respect to that obtained when citrate of soda is added.

The use of citrate of soda dates back to the year 1893, when Wright⁸ and Poynton⁹ showed that it prevented the formation of milk clot by the precipitation of the calcium salts, and it was then suggested that its usefulness in infant feeding might be considerable. Since then many investigators, including Poynton,⁹ Langmead,¹⁰ and Mann,¹¹ have demonstrated its extreme value in the artificial feeding of infants, and their evidence should be sufficient to convince all that the difficulty with cow's milk disappears when prevention of the clot for-

mation is brought about in this way. It should be a sufficient answer as well to the third part of our question, which inquires whether the difficulty may not be one of metabolism, because the food is bovine and not human. Cow's milk can never be of quite the same value to an infant as its mother's milk, but that babies can thrive most successfully upon whole citrated milk there can be now no reasonable doubt. Here it may be pointed out, that the books advise a trial with whole citrated milk in the feeding of marasmic babies, but the advice is usually given half-heartedly and rarely as a routine measure for normal children.

Argument 2.—It is unsound to be drugging a child constantly with citrate of soda.

Cow's milk normally contains calcium and magnesium phosphate, chloride of sodium and potassium, and a small quantity of citric acid. In giving citrate of soda one is not, therefore, adding a foreign element to the milk. In theory and practice, it is a perfectly innocuous body, and has never yet been shown to be the cause of any disagreeable symptoms. On the other hand, rather than accusing it of dangerous properties, it may be looked upon as an efficient preventative of scurvy, and therefore by no means a useless addition to the food. It has been accused of causing constipation. Undoubtedly whole-milk babies suffer with constipation, but there is no reason to suppose that the citrate is the cause of it. The constipation is not more severe than that seen in many breast-fed babies, and in that case it is never looked upon as an indication for stopping the natural food. Certainly constipation is a difficulty to be avoided, or failure may result.

It has been suggested, too, that the necessity for sodium citrate makes whole milk feeding impracticable for the majority of mothers. This is not so. Public Institutions and Wellcomes can supply it quite easily in solution or solid with directions as to the quantity to be used. For others, the chemist can usually supply it in $\frac{1}{4}$ -lb. tins at 1s. 1d. A small eggspoonful will conveniently citrate one pint of milk, which may be citrated and scalded immediately on delivery, and then kept covered and used as required. It would be quite possible to arrange with dairies to supply the milk

citrated.

Argument 3.—Whole milk feeding is too costly for poor mothers.

I think it can be taken, at the present day, that what guides most mothers of the poorer classes in their choice of a food is not the question of efficacy or desirability, but the question of economy. The chief reason why diluted and condensed milks are so frequently used is, because they are the least expensive methods of feeding. While the question of expense stands in the way—and it is a very serious difficulty amongst the poor—it is doubtful whether any form of artificial feeding other than these will ever gain a permanent footing. If such a difficulty does really exist, it will be the duty of the State to step in and provide that which is the bed-rock of artificial feeding—good whole milk.

In comparison, however, with the dried milks and the artificial foods, there is no ground for a statement that whole milk is too costly. The cost of feeding an average baby for nine months upon different foods works out approximately as follows:—The cost is calculated independently of the cost of bottles, teats, etc.

One of the most popular and best known patent foods costs 5*l.* 11*s.* 3*d.*, exclusive of any milk used during part of the time. Another equally as popular, to be used with milk, costs 5*l.* 16*s.* 6*d.* inclusive.

One of the best known dried milks costs as nearly as possible 5*l.* Others cost somewhat less than this. Most reach the 5*l.* Diluted milk plus the addition of cream and sugar works out more expensively than any of these mentioned.

To feed a child with whole milk at 4*d.* a quart costs as nearly as possible 4*l.*, exclusive of sodium citrate. If the mother has to buy this herself, the cost will be increased by about 7*s.*

This part of the subject brings us to the consideration of the dried milks. Dr. Eric Pritchard,¹² in the "Medical Officer" for August, 1913, makes out a very strong case for their use, and all those interested in the question should take the opportunity of reading that article. It tells us that there are three ways in which dried milk is made, in two of which the milk is considerably altered in the drying. In the third method, the drying takes place at a temperature sufficiently

low to ensure that the reconstituted milk shall be almost indistinguishable from fresh raw milk. Each method prepares three qualities :—

- (1) Full cream ;
- (2) Half cream ; and
- (3) Separated milk.

Dr. Pritchard uses one of the separated milks, to which he adds sugar, and fat in the form of an emulsion of linseed oil. The arguments in favour of dried milk would appear to be—

- (a) Their freedom from pathogenic germs—especially tubercle bacilli ;
- (b) The economy of the feeding, if separated milk is used, plus linseed oil and sugar, and
- (c) The ease with which the dried milks, more especially the lower fat ones, may be reconstituted to meet the needs of different children.

Now, while fully recognizing the usefulness of dried milks in the extreme heat of summer and upon occasions when families are travelling, there appear to me to be certain real disadvantages in their use as a routine practice.

Let us examine the bacteriological side first. We are told in this article that an average sample of dried milk contains 4,000 to 10,000 germs per gramme weight. It is, therefore, not sterile, and it is difficult to accept easily the statement that the tubercle bacillus is never present, seeing that its addition to the milk takes place at the source, and that it has a special property of existing in the dried state for quite long periods of time. When all is said and done, fresh milk may quite easily be made germ-free by heat, at any rate from non-sporing organisms, and the assertion, that by heating the milk we spoil it, may be met by pointing out that in two of the three methods of drying milk the finished product is profoundly altered, whilst in the third method the temperature at which drying takes place is not sufficiently high to insure safety. There appears to me to be a great gulf fixed between a scalded fresh milk and a dried tinned one, and if there is any risk of scurvy in the use of either it would seem to lie in the use of the latter.

Dr. Maloney, in his introduction to Professor Budin's book,

makes use of these words: "I do not know of any recorded case of infantile scurvy arising from sterilized milk, where systematic analysis showed the milk to have been consistently of good quality." I think most will agree with him.

The economical side has already been touched upon. Certainly from this standpoint we gain nothing, unless we are prepared to use the "half-fat" and "separated" varieties. To do so lands us in exactly the same position that we were in with fresh diluted milk; in fact, the public, who are not able to discriminate between the different qualities, will be about as well off as they were with a condensed milk. Dr. Pritchard's mixture of separated dried milk, sugar, and linseed oil, appears efficient and cheap, but one doubts whether the introduction of such a method will stand the test of practicality or simplicity.

It is a pity that the profession should have given the dried milks so much support, but there is at least one thing that can be said for them, and that is, that they are infinitely superior to the proprietary foods. The whole question turns on whether babies can be fed on whole milk, and for the benefit of those who have not already found the answer, may I, in conclusion, point out the few rules to be obeyed.

Firstly, the milk must be citrated in the proportion of two grains of sodium citrate to each ounce of milk. Towards the age of six months, the amount may be reduced to half that quantity. Some observers only use one grain from the start, and I am not sure that it does not do just as well. The citrate may be ordered in solution, containing a little chloroform water as a preservative, of such a concentration that each teaspoonful of the solution contains sufficient citrate to deal with, say, half a pint of milk.

How much milk should a baby be given? There appear to be three ways of answering this question. The first is a mathematical one. By considering the relationship of the size of the baby to the condition of its environment, we arrive at the amount of heat being lost, and by calculating the food requirements in calories of heat we can gauge the amount of milk necessary to the half ounce.

The second method consists in giving the child as much as

the weekly exchequer will allow. As long as the volume of food is sufficient to fill the child's stomach, its qualitative value is of minor importance. One of the commonest causes of crying and wakefulness in babies is not wind, colic, and indigestion, but starvation. When a helpless babe is being given, at one month old, two ounces of a mixture containing five drams of milk and eleven of barley water, it is suffering from flatulent starvation; and after nine months of such feeding whole milk only being given towards the end, it can be likened to a melon, large and succulent, but containing little of value.

The third method—and in my opinion the only one worth following—consists in first providing a food which contains all that is necessary for the growing child, and can be digested by the average baby, and then allowing the child to indicate to us the amount it really does require, by those indications of progress that nature has provided, namely, the condition of the stools, the amount of sleep, its weight, and its physical and mental development. Some babies will take more at one feed than another, and most expect and want more after the bath and on waking in the morning than towards the end of the day. A winter baby wants more than a summer one, but the latter requires more liquid, which can be given as drinks of water between the feeds. To allow a child three ounces of food, when it could do with four, means fretfulness and crying until the next feed. We want less humanizing of the food and more of the feeding.

The question still has to be answered as to when exactly whole milk can be started. This question should rarely arise at the start, seeing that the mother should be prevailed upon to feed the child at any rate for as long as she possibly can. If the child has reached the end of the first three weeks or a month and an alternative has to be resorted to, whole milk can be given at once. If the feeding has to be resorted to from birth, I personally dilute half-and-half at the start, and increase as rapidly as possible to whole milk; it rarely happens that one is unable to have the baby on whole milk by the end of three weeks or a month. Usually, whole milk can be given within a few days. In the case of most mothers, it is a week or ten days before the true milk is available, so dilution

up to that time is quite reasonable. The special difficulty that must at all costs be avoided is constipation. What suits one baby will not always suit another, but as a general rule liquid paraffin or equal parts of the confections of sulphur and senna appear to be most useful.

No originality is claimed for citrated whole milk feeding. The method has been before the profession for ten years, but up to the present it has not taken to it in a way that one would expect, seeing the amount of reliable evidence before it. The chief reason is probably the honest prejudice that still exists, the casein bogey being the cause of most of the trouble. It requires a good deal of courage for a young practitioner to order whole milk when the mother, nurse, relations, friends and neighbours are totally averse to it, and until this prejudice is broken down, the feeding difficulty will continue to exist. Whole milk feeding has never been put forward as a method of feeding which will prove successful in every case, and certainly never in preference to breast feeding, but it is recommended as the method of choice when breast feeding is out of the question, and the experience of many goes to show that a baby who will not take whole citrated milk, will not take cow's milk in any reasonable dilution. Such babies certainly do exist, and when they are found some other method has to be tried.

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GASTRIC RADIOSCOPY IN CHILDREN.*

A RADIOSCOPIC STUDY OF THE SHAPE, POSITION, AND MOTILITY OF THE STOMACH IN CHILDREN, AND OF THE TIME TAKEN BY DIFFERENT MEALS TO PASS THROUGH THE STOMACH.

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WHEN first I decided upon taking up this particular line of study, I intended to give a series of meals to a number of children, using the same opaque substance in each, but media of different kinds, such as milk, milk and barley water, citrated milk, bread and milk, porridge and milk, and so on, and taking skiagrams of the stomachs in different phases of the digestion cycle.

My objects were :—

1. To observe the shape and general appearance presented by the stomach in children after a meal ;
2. To note the effect of different foodstuffs on gastric motility ;
3. To find out what were the differences, if any, in the rate at which these substances passed through the stomach ; and
4. To ascertain the average time taken by the stomachs of children, such as are found in a hospital, to empty themselves.

I found, however, that there were practical obstacles, which I need not detail here, which prevented me from carrying out such an extensive series of examinations as I desired. I had to take those children for examination who were convalescent, and they, as a rule, did not remain sufficiently long in hospital to permit me to carry out the series of feeds within the time at my disposal. Then, since each meal required the patient to be screened several times until the

* M.D. Thesis, for which a Gold Medal was awarded.

stomach was empty, that meant, if several meals were given, exposure to X-rays for a large number of times, oftener than was convenient and perhaps advisable.

As to skiagrams, I found, after a short experience, that not only was the process an expensive and laborious one, for to be of any real value a large number of plates for each meal would have to be taken, but it was unnecessary too, for, as the photographs would only be for comparison of one stomach with another, I found that a tracing on paper of the shadows seen on the screen could much more easily and quickly be obtained. I therefore concluded that if I gave each child two or three different meals, the first meal in each case being similar and of same bulk, I might then have a means of comparison between the appearances of different stomachs, and at the same time see whether there were any alterations in the length of time that the stomach took to evacuate after the various substances had been given.

Before beginning upon the examination of the patients, there were several points to be considered, viz. :—

- I. *Is it necessary to add anything to a meal in order to show up the organ containing it?*
- II. *If necessary, what is the most suitable substance to use?*
- III. *What quantity of the material should be given in the meal?*
- IV. *What is the best medium in which to give the substance, especially keeping in mind that it has to be administered to children?*
- V. *What should be the bulk of the meal?*
- VI. *Should the stomach be washed out before administering the feed, or a purge or enema given after?*
- VII. *How long after a previous meal should it be before the feed is given?*
- VIII. *What is the average shape of the stomach?*
- IX. *What position should the patient be placed in, while the X-ray examination is being made?*

I will now discuss these points in detail.

I. and II. *Is it necessary to add anything to a meal in order to show up the organ containing it? If necessary, what is the*

most suitable substance to use?—For the examination of hollow viscera, it has been found necessary to place some substance within them in order to show up their outlines on an X-ray screen. Long ago, Rosenthal advocated blowing up the stomach with air. It is not, however, possible in all cases to distinguish the various regions of the organ when dilated merely by air, and, moreover, the normal form and position of the organ is altered and distorted on inflation. In normal conditions, the intestines cannot be distinguished on the screen, either when full or empty, the only exception being those parts which are filled with gas, such as the two flexures of the large intestine and the upper part of the stomach, which are frequently full of gas. This fact led to the filling of the whole intestines with gas, thus *reducing* their density and rendering the organ visible. This method, however, did not prove of any real utility, for the form and position of the organ were thus rendered abnormal. Experiments were then made to produce an opposite effect, by introducing into the alimentary canal material which *increased* its density.

III. *What quantity of material should be given in the meal?*

—Various substances have been tried and recommended for the purpose of producing a shadow, the chief of these being—the oxycarbonate, oxychloride, and oxynitrate of bismuth; oxide of iron; barium sulphate; zirconium oxide and thorium. I shall mention in more detail the substances named. The method which is most extensively used is one based on Riedel's bismuth meal.

Zirconium Oxide.—It requires nearly double the amount of this salt to give the same density of shadow as that obtained by bismuth oxycarbonate. Moreover, it has a slight sandy taste, to which some patients object.

Anhydric Oxide of Thorium.—This has been recommended instead of bismuth. It is a fine, white, very heavy powder (atomic weight = 232.5, bismuth = 208.5). It is one of the most stable compounds known in chemistry, and is insoluble in HCl and HNO₃. Experiments on animals have shown that it is completely innocuous, and that it passes through the digestive canal entirely unchanged. It is also insipid and odourless, and is one of the most radio-active substances known. 20–60 grammes are recommended, the cost of 20

grammes being about 3s. The price, in my opinion, puts it out of court, seeing that its advantages over bismuth are few, if any.

Iron Oxide.—The magnetic oxide of iron has been recommended as a substitute for bismuth. It seems to be free from all risks, and may with advantage be employed in the form of an emulsion, suspended by tragacanth in water. According to Lewin, it caused no ill-effects, and produced much better results in X-ray pictures than are obtained with bismuth salts.¹

Salts of Bismuth.—Hertz² stated that bismuth oxynitrate (BiONO_3) ought never to be employed for X-ray examinations, for that salt might cause severe poisoning, and on several occasions such poisoning had ended fatally. The first authentic report of bismuth poisoning was published by Kocher, in 1882. He observed that insoluble preparations of bismuth, when applied to large wound-surfaces, may be absorbed to such an extent as to produce characteristic symptoms.

It was found by Shumm and Levy,³ that after the ingestion of BiONO_3 methæmoglobin may be detected by spectroscopic examination, and the experiments of Dorner and Weingärtner have shown that after a bismuth-meal bismuth is excreted from the kidneys.⁴ By spectroscopic methods, evidences of poisoning were detected in all cases after the ingestion of BiONO_3 , even when there were no clinical symptoms of poisoning. No such symptoms occur after the ingestion of bismuth oxycarbonate.

Bohme proved by experiment that the fæces of children in contact with BiONO_3 liberate nitrites, and a case was reported by Rontenberg⁵ in which methæmoglobinæmia and the other symptoms of nitrite poisoning followed the rectal injection of BiONO_3 in oil. These and other cases show that toxic effects from BiONO_3 may be due to absorption not of bismuth but of nitrites. The liberation of nitrites appears to be due to the action of bacteria in the alimentary canal, especially in the sigmoid flexure and rectum. It appears that two forms of poisoning may be produced by BiONO_3 : an acute form, due to nitrite poisoning, and a more chronic form, due to bismuth poisoning.

As a good deal of risk attaches to BiONO_3 adminis-

tration, the bismuth oxycarbonate ($\text{Bi}_2\text{O}_2\text{CO}_3$) was tried. Physiological investigations have shown that the peristalsis of the stomach and, to a still greater degree, the control of its evacuations, by variations in the tone of the pylorus, depend upon the presence of free and organically combined hydrochloric acid. When BiONO_3 comes in contact with the gastric juice, the formation of BiOCl is associated with the liberation of free nitric acid, in amount exactly equivalent to the hydrochloric acid used up. Hence, the acidity of the gastric juice remains unaltered.

On the other hand, a large dose of the carbonate completely neutralizes all the free HCl in the stomach, and the CO_2 liberated does not in any way replace it. Hence, the all-important influence of the free acid in the stomach on the control of the pylorus is lost, and the rate at which the stomach empties itself becomes abnormal, although the actual movements of the stomach and intestines are not altered. BiOCl , however, is quite inert in the stomach, and is uninfluenced by the alkaline intestinal contents. Ladd⁶ was of the opinion, that in a normal stomach bismuth does not of itself retard peristalsis, or in any way interfere with gastric motility, that is in doses up to two rounded teaspoonfuls of $\text{Bi}_2\text{O}_2\text{CO}_3$. He bases this belief on the fact, that he gave double doses of bismuth on the second day, without influencing the rate at which the stomachs were emptied.

It has been pointed out by Hertz⁷, that BiOCl and $\text{Bi}_2\text{O}_2\text{CO}_3$ reached the cæcum and passed through the intestine in approximately the same time, the carbonate being used because more easily obtained; but on the activity of peristalsis of the stomach, the oxychloride had the greater effect, the carbonate having a depressing action on gastric peristalsis.

Barium.—The soluble salts of barium are highly poisonous substances; therefore, one must choose an insoluble compound which will not readily be acted upon by substances that may be met with in the intestinal tract. Barium sulphate (BaSO_4) answers these requirements, for it is practically insoluble, and large amounts have been given without any ill-effects. Nobody has as yet proved, that the organic substances present in the gastro-intestinal tract are capable of producing

a solvent action on BaSO_4 . Barium penetrates with difficulty into the epithelium of the alimentary canal, and is therefore absorbed very slowly.⁸ Barclay states that BaSO_4 notably increases the motility of the stomach, as compared with the usual bismuth-meal.⁹

As the result of his experiments, Groedel⁹ came to the conclusion, that with BaSO_4 the stomach emptied itself twice as fast as with bismuth, and that bismuth somewhat decreased the normal motility of the stomach. For these reasons, he considered BaSO_4 the best contrast substance. He further stated, that with BaSO_4 there is an increased flow of chyme in the small intestine, which is much more pronounced than after the bismuth-meal. BaSO_4 and the bismuth salts do not appear to have much, if any, influence on the motility of the large intestine. BaSO_4 seems to have more advantages as a suitable substance for X-ray examinations, because—

It is much cheaper than any of the others.

It stimulates the flow of chyme into the small intestine.

It produces a satisfactory shadow of the organ on the screen.

The taste of barium meals is more pleasant than any of the others.

Its use is a saving of time, because of its stimulating action, and the examinations may be made at shorter intervals.

One had to consider what the most suitable substance was from several points of view, *e.g.* :—

- a. *Price.*
- b. *Suspensibility.*
- c. *Innocuousness.*
- d. *Bulk.*
- e. *Palatableness.*

a. *Price.*—In connection with this very important item, especially in charitable institutions where large quantities of material are used, I give the prices quoted in a current price-list of a large wholesale firm of druggists. The materials can be bought at a less price when taken in large quantities or by

quotation, but the prices from the list given below are merely for the purpose of comparison :—

			s.	d.	
Bismuth oxycarbonate	-	-	10	9	per lb.
„ oxychloride	-	-	11	6	„ „
„ oxynitrate -	-	-	9	6	„ „
Barium sulphate	-	-	1	0	„ „
(Pure, for X-ray work.)					
Barium sulphate—Merck's	-	-	1	4	„ „
Magnetic iron oxide	-	-	1	0	„ „
Zirconium oxide	-	-	Not listed.		
Thorium oxide	-	-	20 grammes, 3s.		

It will be seen that BaSO_4 is considerably cheaper than any of the bismuth salts.

b. *Suspensibility*.—In order to test how long some of the substances would remain suspended in a liquid, I carried out a series of experiments with BaSO_4 and the bismuth salts in milk and in water. The liquid that cleared first, with a well-defined precipitate, was the one in which the property of suspension was least evident. I took 12 test tubes, and into each I put an equal quantity of water, and then added the substance. At first, I used milk, but there was no clearing of the liquid, nor any sharp line of precipitate, so that comparison was difficult. The tubes were then well shaken, each for the same length of time, the times being noted, and then placed in a rack and kept under observation. In order to avoid being biassed in any way by knowing which substance was in any one tube, I numbered the tubes, and noted the contents against the numbers in a book.

TABLES.

Table I.—In Nos. 1, 5, 7, 10, the supernatant fluid remained turbid much longer than any of the others, 1, 5, 10 being still turbid $1\frac{1}{2}$ hours after shaking up; 8 and 9 cleared first, 11 and 12 cleared next. Next, I shook them up well, and while in a row in the rack I examined them under the X-ray screen, in order to test the intensity of the shadows produced by the various materials. This was not, however, a satisfactory method of testing the density, because some of the substance fell down against the sides

of tubes, these being in a slanting position, and continued to produce a shadow up the tube although no longer in suspension.

c. *Innocuousness*.—As already stated, $\text{Bi}_2\text{O}_2\text{CO}_3$ and BaSO_4 have been given in large quantities without any detrimental effect. According to Günther,¹⁰ as much as $3\frac{1}{2}$ to 5 ozs. of BaSO_4 have been administered to more than 60 persons without harm, and the innocuousness of pure BaSO_4 and the usefulness of Günther's method were confirmed by Bensaude and Ronneaux.

d. *Bulk*.—In regard to the quantity of the opaque substance necessary to be given in order to produce a clear picture, the undernoted figures have been quoted for adults. Groedel gave 250 grammes of BaSO_4 in a 400 c.c. meal.⁹ Gourevitch used five heaped teaspoonfuls for half a litre of fluid.⁹ Günther put 5 ozs. in 17 ozs. of fluid.⁹ Rippman and Hertz said that, except in very fat persons, 2 ozs. of a bismuth salt were ample for all practical purposes.¹¹

Table I.

—	A.	B.	C.	D.	E.	
1. $\text{Bi}_2\text{O}_2\text{CO}_3$ - -	10	3		9		A = grains of substance used.
Sugar - -	5		90+		×	
2. BaSO_4 - -	10	2		4		B = order of clearing and precipitating.
Sugar - -	5		$3\frac{3}{4}$		×	
3. $\text{Bi}_2\text{O}_2\text{CO}_3$ - -	10	3		3		C = number of minutes taken to clear and precipitate.
			$3\frac{1}{2}$		×	
4. BaSO_4 - -	10	2		2		D = order of clearing and precipitating; this was timed, B being judged by eye.
			3		×	
5. $\text{Bi}_2\text{O}_2\text{CO}_3$ - -	20	6		9		E = order of density of shadow on X-ray screen; 1 being most dense; 4 less dense; × less than 4, and all much about equal in intensity.
Sugar - -	10		90+		×	
6. BaSO_4 - -	20	4		3		
Sugar - -	10		$3\frac{1}{2}$		×	
7. BiONO_3 - -	10	1		8		
Sugar - -	5		23		×	
8. BaSO_4 - -	30	5		5		
Sugar - -	15		$4\frac{3}{4}$		2	

—	A.	B.	C.	D.	E.
9. BiONO_3 - -	10	1		1	
			2		×
10. $\text{Bi}_2\text{O}_2\text{CO}_3$ - -	30	7		9	
Sugar - -	15		90 +		4
11. BiONO_3 - -	20	1		7	
Sugar - -	10		$6\frac{3}{4}$		3
12. BiONO_3 - -	30	3		6	
Sugar - -	15		$6\frac{1}{2}$		3

Table II.

—	A.	B.	C.	D.	
1. $\text{Bi}_2\text{O}_2\text{CO}_3$ - -	10	2		7	A = grains of substance used.
Sugar - -	5		80		
2. BiOCl - -	10	7		8	B = order of clearing of supernatant fluid, judged by eye. 1 = 1st to clear.
Sugar - -	5		×		
3. $\text{Bi}_2\text{O}_2\text{CO}_3$ - -	10	6		11	C = number of minutes taken to clear and form precipitate.
			×		
4. BiOCl - -	10	4	64	5	D = order of clearing and precipitating,—timed.
5. $\text{Bi}_2\text{O}_2\text{CO}_3$ - -	20	3		9	
Sugar - -	10		×		
6. BiOCl - -	20	6		10	
Sacch. - -	10		×		
7. $\text{Bi}_2\text{O}_2\text{CO}_3$ - -		1		2	
Sugar - -			$12\frac{1}{2}$		
8. BiOCl - -	30	6		11	
Sugar - -	15		×		
9. BaSO_4 - -	15	2		3	
Sugar - -	$7\frac{1}{2}$		13		
10. BaSO_4 - -	15	3		4	
Sugar - -	10		$17\frac{3}{4}$		
11. BaSO_4 - -	15	5		6	
Sugar - -	15		77		
12. BaSO_4 - -	30	2		1	
Sugar - -	15		$11\frac{1}{4}$		

To test the relative weights, bulk for bulk, of some of the materials I took equal measures, using a pill-box which I filled, levelling off excess with a spatula, and found as follows:—

$\text{Bi}_2\text{O}_2\text{CO}_3$	-	-	-	weighed grains	54
BiONO_3	-	-	-	"	89
BaSO_4	-	-	-	"	99
Sacchar. alb. pulv.	-	-	-	"	60

In actual practice, it is a saving of time and labour if one can measure out the quantity of powder to be given, instead of having to weigh it out on each occasion. In the case of children, I have found an ordinary teaspoon very handy. Some recommend *heaped* teaspoonfuls to be used. The quantity in a heaped teaspoon varies according to the amount of heaping, and if the substance is a heavy one the weight of one lot may be much greater than another. Although a few grains more or less are of no importance, it is quite as easy, and a much more accurate way, to use *level* teaspoonfuls.

The method I adopt is to take a spoonful of the powder, and then level it off by placing the edge of a spatula at the junction of the handle with the mouth of the spoon, and, with one sweep, levelling off the portion of powder above the brim. In order to test the value of this method I weighed several lots, and the figures speak for themselves. The spoon used was an ordinary teaspoon, the capacity being 90 minims.

Bismuth oxycarbonate—

A <i>heaped</i> teaspoonful weighed	-	grains	88
" " "	-	"	96
" " "	-	"	96
" " "	-	"	120
A <i>level</i> teaspoonful	-	"	58
" " "	-	"	59
" " "	-	"	60
" " "	-	"	56

Sacch. alb. pulv.—

A <i>level</i> teaspoonful weighed	-	grains	37
" " "	-	"	39
" " "	-	"	39
" " "	-	"	39

e. *Palatableness.*—Neither bismuth nor barium is disagreeable

when mixed up with the food, but barium is the pleasanter.

Since the meals were to be given to children, I thought it better, when administering the substance in milk, to add sugar; first, because the sugar in solution assisted in suspending the powder, as shown in Tables I. and II., and secondly, because the meal was more readily taken by the children owing to its sweetness. Cane sugar (*Sacch. alb. pulv.*) was used, as being cheaper and sweeter than lactose. The sugar is useful when using a liquid such as milk, but I do not think it is necessary when a thicker medium is used, unless the child cannot be induced to take the meal unless it is sweetened.

IV. *What is the best medium in which to give the substance, especially keeping in mind that it has to be administered to children?*—One can imagine that the nearer the special meal approaches the normal meal in taste and consistence, the more nearly normal will the results be.

V. *What should be the bulk of the meal?*—In dealing with very young children, for whom spoon-feeding has to be adopted, it is necessary to give a fairly fluid substance, so that it may be swallowed sufficiently quickly to prevent the bismuth (or other substance), taken in the first portion of feed, from settling out in the stomach before the last portion of the meal is taken. For older children, who feed themselves and can sup quite well, the meals given to adults will answer, allowing a quantity proportional to age; for adults, various formulæ are used.

Hertz¹³ found that the more fluid his bismuth mixture was, the more rapidly it passed into the intestine. He was of opinion that the bismuth was best taken well stirred up in a bowl of bread and milk. Rechon¹³ lays stress on the fact that the mixtures of bismuth and gum-syrup have a tendency to form a double layer in the stomach, to obviate which he recommends the following formula:—

Bismuth. oxycarb.	-	-	-	gms. 120
Acaciæ pulv.	-	-	-	„ 20
Tragacanth. pulv.	-	-	-	„ 5
Syrup. simpl.	-	-	-	c.c. 150
Aquæ	-	-	-	„ 350

This is said to produce a bismuth liquid, which is homogeneous, gives no sediment, and remains perfectly homogeneous for more than 24 hours. Cole used 2 ozs. $\text{Bi}_2\text{O}_3\cdot\text{CO}_3$ suspended in 8 ozs. of thick buttermilk.¹⁴

Groedel gave a barium porridge⁹ :—

Barium sulphate	-	-	-	gms.	250
Maize flour	-	-	-	"	20
Sugar	-	-	-	"	20
Cocoa	-	-	-	"	20
Water	-	-	-	c.c.	400

Gourevitsch recommends the following¹⁵ :—

Potato flour	-	One and a half to two heaped
		teaspoonfuls.
Milk	-	Teacupful.
Syrup of orange	-	Three dessertspoonfuls.
Bismuth carbonate	-	Five heaped teaspoonfuls.

Schlesinger suggested bismuth pudding,¹⁶ but I do not know its composition. He, apparently, was in favour of a medium more or less solid. Milk, bread and milk, porridge and milk, and sweetened porridge have been used largely in this country. A suitable medium should be easily and quickly prepared; agreeable to the patient; as like a normal meal as possible; of assistance as a suspending agent; no less digestible than an ordinary meal; and capable of being given warm.

Milk is about as handy as anything that can be used, but, unfortunately, as it is only a thin emulsion, it does not help much to keep the powder in suspension. Bread and milk is much better; it is a thing that practically everyone can take, and is more satisfying to the patient than milk alone. When bread is cut up, put in boiling milk, and well beaten up, it forms an excellent medium for X-ray purposes. Porridge and milk is very good too; but, unfortunately, there are many who do not appreciate the value of good oatmeal porridge, and to whom it is not an appetizing dish. Thick buttermilk is excellent, but good buttermilk cannot always be easily obtained, and some people do not like it.

I consider that bread and milk, porridge, and thick buttermilk are much handier, cheaper, and no less satisfactory

for the purpose required than more fanciful preparations. Barclay is of opinion that the composition of the food seems to be of no practical moment, provided it does not nauseate the patient.¹⁷

VI. *Should the stomach be washed out before administering the feed, or a purge or enema be given after?*—In my experiments, I decided that the washing-out would be an unnecessary ordeal for the children. I therefore gave them the testing meals not earlier than *four hours after* the previous feed, allowing what I thought an average time for the stomach to become empty. Practically all the children had been having aperients beforehand to keep the bowels open daily, for it would be quite natural to assume that the presence of a constipated condition might have some retarding influence on the rate of stomach evacuation. I have not found any constipation or other disturbance in the normal activity of the alimentary canal after a barium or bismuth meal.

It is a common belief that bismuth has a constipating action, for it is much prescribed in cases of diarrhoea, but Hertz¹⁸ believes that bismuth salts only influence those cases of diarrhoea in which excess of hydrogen sulphide has developed as a result of abnormal putrefaction. This gas is a powerful stimulant to the intestinal movements, but is rendered inert by combining with bismuth. I think some such neutralizing action on the part of the bismuth is quite a feasible argument, for I do not see how a few grains given to a child, say four-hourly, can be of any value in acting as an efficient protection to the mucous membrane of the intestines.

To believe in the theory that bismuth protects the mucous membrane mechanically, one must assume that the bismuth spreads itself along and around the bowel, so as to form a kind of internal coating for the intestine, or else that by some unknown mechanism or mysterious influence it finds its way to the particular part of the bowel affected, and there deposits itself for a time as a bulwark against the disturbing agents. From observations, made during the passage of a bismuth meal through the intestines, by means of the X-rays, there does not appear to be any such distribution, for the bismuth seems to be mixed up with the intestinal contents, and the shadows in the bowels are largely in the form of nodules or aggregations

of nodules, rather than the columnar form one would expect if a coating had been formed.

It is quite unnecessary, according to Barclay,¹⁷ to give purgatives in order to clear out the bismuth after an examination, for in large doses it passes through unaltered, and gives rise to neither constipation nor diarrhoea. That has been my own experience, in most cases, after giving bismuth meals to adults, as well as to children during the past two years; hence, there seems to be no necessity to give either a purge or an enema afterwards.

VII. *How long after a previous meal should it be, before the feed is given?*—It is desirable that the stomach should be empty; so the question arises how long a normally functioning stomach takes to become empty. Halliburton says the average time is probably *about three hours*, and that after an ordinary mixed meal the pylorus in the adult usually opens for the first time about half-an-hour after digestion begins.¹⁹ Reider, using $\text{Bi}_2\text{O}_3\text{CO}_3$, found that the stomach emptied in from *three to three and a half hours* after food. On the other hand, Groedel, using BaSO_4 , found it empty in from *one and a half to two hours*.

Holzknacht's view is, that the normal time²¹ for the complete evacuation of the stomach varies between *two and eight hours*. That is allowing a very wide margin, for stomachs that are not normal may, in many cases, be empty within the latter figure. Hertz is of opinion that a meal, consisting of half-a-pint of porridge mixed with two ozs. of BiOCl , is completely evacuated by the stomach in *about four hours*, and that if any bismuth is still seen in the stomach six hours later, gastric stasis is certainly present.²² Groedel elsewhere says that a normal stomach becomes empty in from *two to six hours*.²³ Sgalitzer mentions *three hours* as being the normal time.²⁴

Leven and Barrett record that observations made on infants from two to six months old, by giving 80 to 175 c.m. of mother's milk or diluted cow's milk, showed that evacuation lasted from *one and a half to two hours* in both cases.²⁵

There appear to be many factors upon which gastric digestion depends, such as the age of the child, the quantity of food administered, the composition of the food, and the

individual peculiarities of the child. Normally, some of the food appears in the small intestine very soon after the feed has been given, for some of the material in some cases may be seen passing out of the pylorus as soon as the examination is made, immediately after ingestion of the meal.

In many instances, the emptying process goes on rapidly at first and then slackens off, so that sometimes after two hours the process is very slow. This condition of relative inactivity of the stomach, as regards motility after the first two hours, appears to be due in part to the lack of sufficient distension of the stomach, which seems to be a factor in stimulating peristalsis.

The view is put forward by Ladd that if an infant is given a bismuth feed, and then at the end of three hours another feed *without* bismuth is administered, the new feed does not mix intimately with the bismuth residue of the earlier feeding, but appears to stimulate the contraction of the stomach as a whole, and the expulsion of the residue is accelerated by the new feeding.⁶ The expulsion is not immediate, but is more rapid than if the stomach is allowed to empty itself without the stimulus to peristalsis which the new feed imparts. He did not find a child whose stomach was completely emptied in two hours, and, in his opinion, it is exceptional for it to be emptied before three and a half hours. If the peristaltic action is not stimulated by a new feeding, the emptying time is much more likely to range from *four and a half to five and a half hours*; but the character of the food is an important factor in determining the time required.

Rulison states that cow's milk mixtures seldom leave the stomach of the normal infant in less than from *two and a half to three hours*, and he has found milk present in the stomachs of healthy babies five hours after a feeding during the hot weather.⁶ It is taught by Holt,²⁶ that the part taken by the stomach in digestion is not so important in infants as in adults, for the food leaves the stomach so rapidly that a large part of the casein must pass into the intestine before it is converted into peptones. The opinion has been gaining ground, that the function of the stomach is largely that of a reservoir, and that the gastric process is only a preliminary and partial one, even in the digestion of proteids, this being completed in

the intestine. Holt thinks that it should not be necessary to feed a normal child oftener than once in four hours.

VIII. *What is the average shape of the stomach?*—On this point, various opinions have been expressed.

According to Holzknecht, the shape²⁷ of the normal stomach is that of a *cow's horn*, the broad part being above and lying vertically, and the narrow pyloric end forming the lowest portion.

Reider²⁷ believes that normally the stomach is *hook-shaped*, and that the pylorus, being at the end of a small hook, passing upwards and to the right from the lower end of the main vertical part, is not the lowest part of the stomach.

It is stated, too, by Hurter²⁷ that the shadow of the stomach as generally seen is *hook-shaped*, and that it lies nearly vertically, with a slightly turned up distal portion.

Stillier,²⁷ however, thinks that these tubular stomachs are due to the action of the bismuth on the gastric mucous membrane, and that the stomach is not the vertically placed tube of the radiologists, but a more or less horizontally placed *sac*, as shown by clinical examination.

Manders'²⁸ view is that the general shape of the stomach resembles that of a *Dutchman's wooden shoe*, of which the tip represents the pylorus.

The empty stomach, says Groedel,²⁹ appears like a flabby, folded tube, and therefore cannot be reproduced by the Roentgen-rays. He found the Reider form (hook) to be the normal form of the stomach, and from its function he termed it the *syphon form*. He thought that the form of the stomach was the result of the concentrated pressure of the surrounding organs and the gravitation of the food. If the stomach were a loose sack, the ingesta would collect in a loose mass at the bottom, but the bismuth fills the stomach in a uniform way to the highest point. The shape of the stomach changes with every position taken by the body, for the stomach hangs loose. It was pointed out as well by Groedel,³⁰ that when a normal stomach is filled with a double-sized bismuth meal, it extends no lower than with the ordinary meal. It merely becomes somewhat broadened out.

In atonic ectasis, double or even three times the normal bismuth meal is not sufficient to fill the stomach. The food

merely collects in the lowest portion. Block confirmed this. He found that the stomach, into which more food had been introduced than was normally required to fill it, was neither distorted nor overdistended.³¹

The opinion is expressed by Leven and Barrett that the adult stomach presents a vertical direction, with a right border corresponding to the lesser curvature, the left border being formed by the greater curvature, and the whole organ being contained in the left hypochondrium. In the infant, on the other hand, the aspect is entirely different; the gastric cavity appears transverse, the greater curvature forms its lower horizontal border, and it occupies both hypochondrial regions. Altogether it has the shape of a *bag-pipe*. This form, which is never seen in the adult, appears, on the contrary, to be normally that of the infant's stomach. In the infant, the lowest point of the stomach is the middle of the greater curvature, and is very movable.²⁵

Barclay declares that as the patient grows older the stomach elongates, and that it has *no fixed shape*, being a plastic organ.³²

Cushny³³ states that in infants the shape of the organ is much more *globular*, and during the first year is comparatively spherical; but as the child assumes the upright position, the stomach elongates, and it is not till near the age of puberty that the lower border descends to the umbilicus.

IX. *What position should the patient be placed in while the X-ray examination is being made?*—In the prone position, the food tends to stay in the cardiac portion for some time before it is passed on into the pyloric end, and it is not seen passing into the intestine nearly so quickly as when the patient assumes the upright position. It has been said that the stomach seems to empty itself much less rapidly when the patient is lying on his back, for the stomach is then no longer in the most dependent position. Hertz believes that the peristalsis in the neighbourhood of the pylorus and the bismuth passing into the duodenum can be seen more easily when the patient is lying down.⁷

It is stated by Barclay,³² that changes in posture affect the shape of the stomach considerably, but that peristalsis is easily made out whether the patient is lying or

standing. MacNaughton found that the infant stomach was globular in form and occupied a position just below the diaphragm, and that when the infant was held upright before the screen, it had little effect on the shape of the shadow beyond a slight lengthening.³²

Since the patients to be examined were children, another point arose for consideration, viz., *the utility for digestive purposes of diluents of milk in feeds given to children.*

It is commonly supposed that infants cannot readily digest unmodified cow's milk, owing to the density of the curd produced in the infant's stomach. Most attention has been fixed on the excess of casein in cow's milk, which has been made responsible for the formation of the tough curd, and less notice has been taken of the other important factor in coagulation, viz., the calcium salts, which are also in excess in cow's milk.

Wright³⁴ has shown that a flocculent curd can be produced, if the excess of calcium salts are thrown down by the addition of two grains of sodium citrate to the ounce of milk. This method of feeding obviated the necessity of dilution, and consequently of adding cream and sugar. Whole milk possesses certain advantages over diluted milk, for it is less bulky, and so less likely to produce distension of the stomach, and no cream has to be added.

After experimenting on the curdling of milk by means of acetic acid, Cautley³⁵ came to the conclusion that the size, softness, and coherence of the curd depend mainly upon the degree of dilution. Weak barley-water acted as the best diluent, better than stronger barley-water and lime water. Neither of the latter appeared to produce better results than plain water. Old milk will form denser curds, and more quickly with less acid, than new milk.

In regard to proteins, the theory was put forward by Ladd that the amount of casein, when it is in a coagulable form, is the most important factor in delaying the emptying of the stomach, but that a moderate amount of fat favours expulsion.⁶

Albumen water and gelatine solutions do not seem to have any special value as diluents in their effect on coagulability.

The action of the farinaceous and other substances used is

purely mechanical, getting between the particles of casein during coagulation and preventing them running together into large coherent masses.

It is claimed for Benger's Food that it is a special wheaten flour, containing in suitable amount the two active digestive principles—amylase and trypsin—and devised to be used in conjunction with cow's milk, partially digesting the casein and preventing the formation of large clots.³⁶

Still says that it is indisputable that some infants can digest cow's milk better when diluted with barley water than when diluted with plain water.³⁷ He further states that in some experiments which he had made, lime water seemed to have some definite, though slight, effect in diminishing the firmness of the curd, and that there can be no doubt, from clinical experience, that it assists digestion to some extent. Moreover, it is certain that many children, who have previously had difficulty with curd, can digest cow's milk well when sodium citrate is added, and this has the advantage over barley water in that it is not liable to cause flatulence.

In carrying out my investigations, I took children of various ages, and in about four hours, after a feed, I gave them the meal containing the opaque substance. The child was brought to the X-ray room, where the meal was administered. He was then placed at once on the table, and the stomach examined through the X-ray screen. The food was given warm, so as to obviate any retarding action that a quantity of cold material might have when introduced into a stomach usually accustomed to a warm meal. The powder was well incorporated first. When the child could not sup by itself, or took a long time when assisted, a fluid meal was given which it could drink, the mixture being well stirred frequently.

All cases were screened with the patient lying on his back, because :—

- a. There are obvious difficulties and disadvantages in trying to screen young children, especially infants, in the upright position, and there seemed no decided advantage in doing so.
- b. The question was not primarily as to the *position* of the stomach, but as to *the time taken to empty*, and

that only as a comparison with different children, and between different substances and foodstuffs.

It was, I considered, only necessary that they should all be taken in the same position. Besides, the children were in hospital, some confined entirely to bed, others for shorter or longer periods during the day, in all cases longer than if they had been at home, well. Their bodies were not having the exercise, and consequent assistance to digestion, that those of children in health usually have; so the results can only be relative ones so far as such cases are concerned. The patients, however, were all in a convalescent or healthy state, and free from any known gastric disturbance.

I decided to give them all the same size of meal, for naturally one would expect that a big feed would take longer to pass out of the stomach than a small one, and the greater the bulk the more bismuth will be required; for instance, 1 oz. in 5 ozs. must produce a deeper shadow, than if the 1 oz. were scattered throughout a 20 oz. volume. Six ounces of food, to which was added the powder, were given in each case, as I expected to have to deal with children of various ages. I thought that would prove a suitable comparative quantity for all ages. It is said that a large quantity of bismuth given in a meal causes some distortion of the stomach, but I considered that the small quantity of material that I gave could not have any effect in producing distortion.

In examining the patient, the screen was placed without pressure on the abdomen, for the appearance of the stomach alters with pressure, and a coin was placed over the umbilicus to mark its position. The appearance on the screen was observed, and then a piece of thin paper, through which the shadows could easily be seen, was placed on the screen, and the outlines of the stomach shadow quickly traced upon it. As the stomach sometimes changed shape before the outline-tracing could be completed, one had in such cases to wait until the next similar phase in the cycle of contraction came round. By very quickly making a vertical and a transverse line to the boundaries, that acted as a guidance to a more accurate tracing of the outline.

I tried a sheet of transparent celluloid for making the

tracings upon with a dermatographic pencil, the marks of which could be quickly wiped off by a little ether on cotton-wool. That was very good when only one patient was being done at a time, or when one had a sheet for each patient, but I found white tissue paper and transparent greaseproof paper to be more expedient in practice, for the tracings may then be transferred to a book by means of carbon paper at one's leisure.

I shall now give particulars of the various meals which I administered, showing,

- The kind of meal administered,
- The time at which meal given,
- The times at which patient examined,
- The observations made on examination,
- The period required for evacuation of stomach,
- The tracings of shadows seen on the screen.

Abbreviations used:—Ba, Barium, Barium sulphate; Bi, Bismuth, Bismuth oxycarbonate; Stom., stomach; Hrs., hours; Sugar, powdered cane-sugar; Teasp., level teaspoonfuls; A.C., before food; P.C., after food.

CASE I. E. F., age 4 years. Two meals given.

First Meal at 3.45.

Bismuth, $\text{Bi}_2\text{O}_3\text{CO}_3$	-	-	-	4	teasp.
Sugar	-	-	-	2	"
Milk	-	-	-	6	ozs.

At 6.15. Most of Bi in stom., which appears like a sausage, pointing downwards and to the right, with a bulbous portion at cardiac end. Small pieces seen now and then to be shot out of pylorus.

Some of Bi in left lumbar region, to which part pieces are seen to travel like large beetles moving quickly across the abdomen.

At 7.45. Some in cardiac end still, but shadow not so intense. No peristalsis seen, stom. appears at rest. No shadow seen at pylorus. (Unable to examine later.) Not empty after 4 hrs.

Second Meal at 12.40.

Bismuth	-	-	-	4	teasp.
Sugar	-	-	-	2	"
Liquid paraffin	-	-	-	$\frac{1}{2}$	oz.
Milk	-	-	-	$5\frac{1}{2}$	ozs.

12.40. Stom. well above umbilicus; somewhat S-shaped with bulbous fundus, with a tail over to pylorus.

1.30. Stom. more elongated and much thinner.

2.40. Still thinner.

3.15. Stom. not quite empty; globular, like a marble.

3.45. Stom. empty in 3 hrs. Patches scattered throughout abdomen.

CASE II. J. D., age 7 years. *Three meals given.*

First Meal at 12.40.

Bismuth	-	-	-	-	4	teasp.
Sugar	-	-	-	-	2	"
Milk	-	-	-	-	6	ozs.

12.40. Stom. appears as pear-shaped body, with a tailing towards pylorus, which seems closed.

1.40. Stom. continually changing shape. Peristalsis seen to begin at cardiac end, which became spherical, then some material was passed along and cut off by a constriction; the part at pylorus became bulged out on closure of pylorus. Next, material was seen to shoot out of pylorus, and then the cycle began again. The stom. in the peristaltic cycle, sometimes two, sometimes three bulgings were seen. The shadow varied in intensity and size, as though there were movements in more than one plane.

3.5. Stom. still in active peristalsis.

4.5. Stom. empty in 3.25 hrs. Abdomen has the appearance of a sea crowded with islands, with most of the islands scattered below the umbilicus.

Second Meal at 12.55.

Bismuth and sugar	-	-	-	-	6	teasp.
Barley water	-	-	-	-	3	ozs.
Milk	-	-	-	-	3	"

12.55. Stom. appears as globular mass. No peristalsis.

2.55. Stom. empty in 2 hrs. Large air-space in position of stom.

Third Meal at 12.50.

Trumilk (a dried milk in powder)	-	-	-	-	2	teasp., heaped.
Bismuth and sugar	-	-	-	-	6	teasp.
Water, warm	-	-	-	-	6	ozs.

2.50. Stom. empty in 2 hrs. Some material in duodenum as though just out of pylorus. Shadows scattered all over upper part of abdomen, and at and above level of umbilicus.

CASE III. J. E., age 7 years. *Four meals given.*

First Meal at 12.50.

Bismuth and sugar	-	-	-	-	6	teasp.
Milk	-	-	-	-	6	ozs.

12.50. Stom. in peristaltic action within two minutes after ingestion of meal. Stom. has bulbous cardiac, with long tailed-out body in crescentic form with concavity upwards. Material seems to be passing along to pylorus in a thin stream, retarded for a short space at pylorus, and then shot through.

2.0. Peristalsis present.

3.10. Stom. peristalsis. Shadow horizontal, long, narrow, and crescentic.

4.10. Stom. empty in 3.20 hrs.

Second Meal at 1.20.

Bismuth and sugar	-	-	-	6	teasp.
Liquid paraffin	-	-	-	$\frac{1}{2}$	oz.
Milk	-	-	-	5 $\frac{1}{2}$	ozs.

- 1.20. Bulbous fundus, with commencing peristalsis at pylorus.
 3.20. Stom. vertical, except a turned-in portion at pylorus. Nodules seen passing out of pylorus slowly.
 3.50. Shadow now down at pylorus, with a faint vertical outline of body.
 4.5. Peristalsis present. Pieces seen passing out of pylorus.
 4.40. Stom. empty in 3.20 hrs.

Third Meal at 11.50.

Bismuth and sugar	-	-	-	6	teasp.
Benger's Food (fairly thick)	-	-	-	6	ozs.

- 11.50. Appearances similar to those in previous feeds.
 2.30. Stom. empty in 2.40 hrs. Air-space in position of stom.

Fourth Meal at 1.0.

Bismuth and sugar	-	-	-	6	teasp.
Trumilk	-	-	-	2	heaped teasps.
Water, warm	-	-	-	6	ozs.

- 1.0. Stom. high up in left hypochondrium.
 3.0. Stom. empty in 2 hrs.

CASE IV. M. B., age 2 years. *Two* meals given.

First Meal at 1.10.

Bismuth and sugar	-	-	-	6	teasp.
Milk	-	-	-	6	ozs.

- 1.10. Stom. appears as large globular mass in left hypochondrium. No peristalsis seen.
 3.10. Stom. not empty.
 3.40. Stom. shows active peristalsis.
 4.40. Stom. not yet empty. Active peristalsis present. (Unable to examine patient again.) Not empty after 3.30 hrs.

Second Meal at 12.10.

Sodium citrate	-	-	-	12	grains.
Bismuth and sugar	-	-	-	6	teasp.
Milk	-	-	-	6	ozs.

N.B.—The sodium citrate was dissolved in the milk first, and then the bismuth and sugar added and well stirred up. The mixture was frequently stirred whilst being taken.

- 12.10. Stom. pear-shaped, with apex towards the left, and in left hypochondrium. The mass was seen to contract intermittently; then,

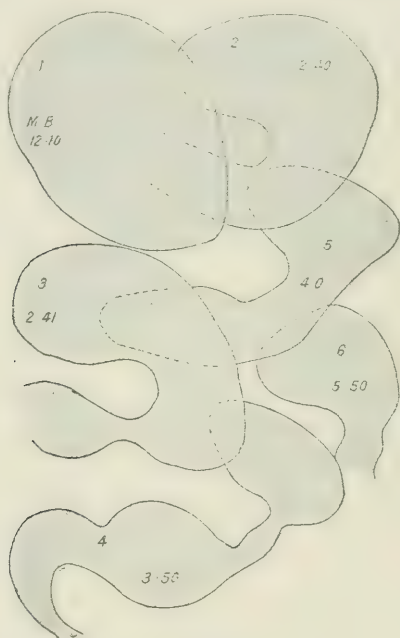
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while under observation, nodules were seen to pass rapidly in succession downwards, backwards and to the left, then became more distinct as though approaching surface, passed to left of umbilicus, and again became less visible. The lower part of stom. showed a deeper shadow, as though the bismuth were falling to the most dependent part.

2.40. Stom. in active peristalsis. Appearance of stom. altered according to position in which patient placed.

5.0. Stom. still actively changing shape.

7.30. Stom. not quite empty after 7.20 hrs. (Unable to examine again.)



Case IV

CASE V. K. H., age 12 years. One meal at 10.30.

Bismuth and sugar - - - 6 teasp.

Benger's Food - - - 6 ozs.

2.30. Stom. empty in 4 hrs.

CASE VI. M. S., age 1½ years. One meal at 4.45.

Bismuth and sugar - - - 6 teasp.

Milk - - - 6 ozs.

5.55. Stom. in active peristalsis. Cardiac portion globular, and high up towards diaphragm. Meal seen passing down to pylorus in an intermittent stream.

8.0. Stom. empty in 3.15 hrs.

CASE VII. T. W., age 8. Two meals.

First Meal at 10.15.

Bismuth and sugar	-	-	-	6	teasp.
Benger's Food (3j in oj milk)	-	-	-	6	ozs.

10.20. Stom. high up in left hypochondrium, changing shape, but no pylorus seen.

12.35. Still a good deal in stom.

2.30. Stom. empty in 4.15 hrs.

Second Meal at 10.40.

Barium	-	-	-	3	ij.
Sugar	-	-	-	3	j.
Benger's Food	-	-	-	3	vi.

1.40. Stom. empty in 3 hrs.

CASE VIII. L. P., age 9 years. *Two* meals.

First Meal at 10.40.

Bismuth and sugar	-	-	-	6	teasp.
Benger's Food	-	-	-	6	ozs.

2.55. Stom. empty in 4.15 hours.

Second Meal at 11.5.

Barium	-	-	-	3	ij.
Sugar	-	-	-	3	i.
Benger's Food	-	-	-	3	vi.

11.5. Shadow not so intense nor so distinct as with bismuth in first meal.

2.5. Stom. empty in 3 hrs.

CASE IX. P. D., age $1\frac{5}{12}$ years. *Two* meals.

First Meal at 10.35.

Bismuth and sugar	-	-	-	6	teasp.
Benger's Food	-	-	-	6	ozs.

10.35. Stom. in active peristalsis; pylorus closed; then almost at once it commenced to contract.

2.35. Stom. empty in 4 hrs.

Second Meal at 10.40.

Barium	-	-	-	3	ij.
Sugar	-	-	-	3	iss.
Benger's Food	-	-	-	3	vj.

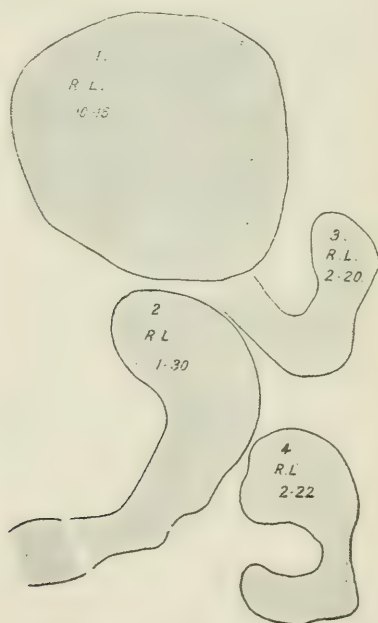
2.20. Stom. empty in 3.40 hrs.

CASE X. R. L., age 6 years. *Two meals.*

First Meal at 10.15.

Bismuth and sugar - - - 6 teasp.
 Benger's Food - - - 6 ozs.

- 10.15. Nothing seen of pylorus.
 2.20. Stom. in active peristalsis.
 2.45. Stom. changing shape so rapidly that tracing of outline is difficult.
 By turning patient on his right side the mass fell towards the pylorus;
 on placing him on his left side the stom. appeared quite different, being
 bigger and longer.
 3.15. Still a trace in stom.
 3.45. Empty in 5.30 hrs.



Case X.

Second Meal at 10.25.

Barium - - - 3ijj.
 Sugar - - - 3iss.
 Benger's Food - - - 3vi.

- 12.55. Peristalsis not so active as at 10.55.
 3.0. Active peristalsis seen.
 3.25. Stom. empty in 5 hrs.

CASE XI. L. M., age 8 years. *Two meals.*

First Meal at 10.25.

Bismuth and sugar - - - 6 teasp.

Benger's Food - - - 6 ozs.

10.25. Stom. contracting vigorously, and material commencing to pass out of pylorus.

1.40. Stom. empty in 3.15 hrs.

Second Meal at 10.50.

Barium - - - 3iij.

Sugar - - - 3iss.

Benger's Food - - - 3vi.

12.50. Stom. empty in 2 hrs.

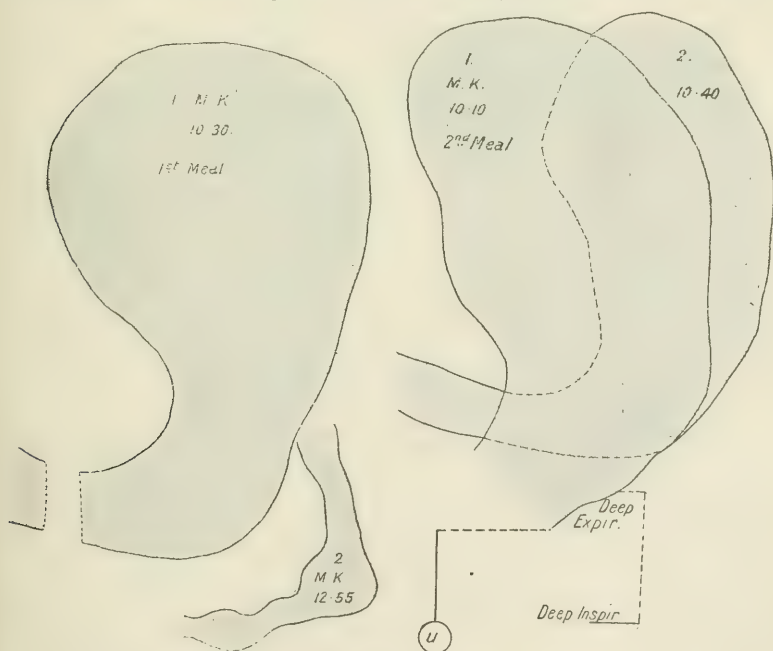
CASE XII. M. K., age 8 years. Four meals.

First Meal at 10.30.

Barium - - - 3iij.

Bread and milk - - - 3vi.

10.30. The meal was taken slowly by the patient, and she was screened immediately on finishing. Stom. seen in active peristalsis soon as examined, and material seen passing along and out of pylorus.



Case XII.

12.55. Shadow ill-defined; continuous peristalsis, so unable to trace outline.

1.10. Stom. empty in 2.40 hrs.

Second Meal at 10.10.

Barium	-	-	-	-	3iij.
Liquid paraffin	-	-	-	-	3iv.
Bread and milk	-	-	-	-	3vss.

The paraffin mixed well with the meal, and was not objected to by the patient.

1.40. Stom. empty in 3.30 hrs.

Third Meal at 10.55.

Bismuth	-	-	-	-	3ii.
Bread and milk	-	-	-	-	3vi.

12.55. Stom. empty in 2 hrs.

Fourth Meal at 10.25.

Barium with bread and milk as in the first, but before this meal had all gone out of the stomach another meal, the patient's ordinary dinner, without barium, was given. The patient was screened immediately before and immediately after this second meal.

12.35 *a.c.* Vertical shadow seen.

12.50 *p.c.* No shadow seen in position of vertical shadow, but a transverse intense shadow seen above umbilicus.

1.25. Transverse shadow still present, but much narrower.

1.45. No shadow seen in stom. after 3.20 hrs.

CASE XIII. L. K., age 12 years. *Two meals.*

First Meal at 10.20.

Barium	-	-	-	-	3iv.
Bread and milk	-	-	-	-	3vi.

12.40. Stom. empty at 2.20 hrs.

Second Meal at 10.55.

Bismuth	-	-	-	-	3iiij.
Bread and milk	-	-	-	-	3vi.

12.55. Stom. empty in 2 hrs.

CASE XIV. E. P., age 7 years. *Two meals.*

First Meal at 10.5.

Bismuth and sugar	-	-	-	-	6 teasp.
Milk	-	-	-	-	6 ozs.

10.5. Stom. in active peristalsis; material passing out of pylorus

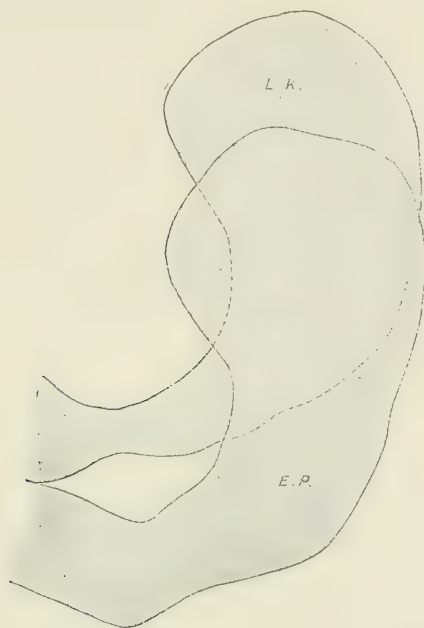
12.30. Stom. changing shape very quickly.

1.0. Nodule at pylorus.

1.35. Stom. empty in 3.30 hrs.

Second Meal at 11.15.

Bismuth and sugar -	-	-	6 teasp.
Milk -	-	-	3 ozs.
Lime water -	-	-	3 „



Cases XIII. and XIV.

11.15. Stom. appears as rounded mass, not clearly defined, as though bismuth had sunk back to most dependent part, so that superficial parts not so well seen.

1.15. Shadow ill-defined; trace only in stom.

1.30. No stom. shadow; empty in 2.15 hrs.

CASE XV. C. M., age 2 years. *Two meals.*

First Meal at 10.25.

Bismuth and sugar -	-	-	6 teasp.
Milk -	-	-	6 ozs.

10.25. Stom. contracting, but no pyloric peristalsis seen; nothing passing out of stom.

12.45. Contraction so active, and outline of shadow so indefinite that tracing cannot be made; masses seen passing across abdomen and coming to rest with many other nodules below region of splenic flexure.

1.40. Stom. empty in 3.15 hrs.

Second Meal at 11.5.

Bismuth and sugar	-	-	-	6	teasp.
Milk	-	-	-	3	ozs.
Lime water	-	-	-	3	„

11.5. Motility of stom. appears quicker than in case of first meal.

1.5. Still small quantity in stomach; peristalsis present; long streak of gas in stomach.

1.25. Stom. empty in 2.20 hrs.

CASE XVI. E. C., age 7 years. One meal at 10.30.

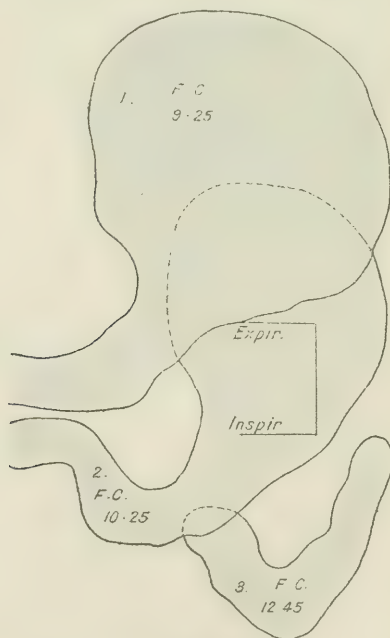
Barium	-	-	-	4	teasp.
Bread and milk	-	-	-	6	ozs.

2.30. Stom. empty in 4 hrs.

CASE XVII. F. C., age 11 years. Two meals.

First Meal at 9.50.

Barium	-	-	-	3	ij.
Bread and milk	-	-	-	3	vi.



Case XVII.

12.45. Stom. contracting actively; nodules seen passing quickly to region of splenic flexure.

1.30. Streak seen, as though some residue were adhering to gastric mucous membrane. Empty in 3.40 hrs.

Second Meal at 10.20.

Same as first, but a second meal—the patient's usual dinner—without barium, was given before the first meal had entirely left the stom. Observations were made before and after this other meal was given.

12.30. Stom. shadow seen.

12.45. No definite outline of stom., but a haziness seen in that region. A deep shadow in pyloric region and another to left of umbilicus.

1.20. No definite shadow in position of stomach. Empty in 3 hrs.

CASE XVIII. A. P., age 5 years. *Two meals.*

First Meal at 10.15.

Barium	-	-	-	-	3iij.
Bread and milk	-	-	-	-	3vi.

1.55. Stom. empty in 3.40 hrs.

Second Meal at 10.30.

Barium	-	-	-	-	3iij.
Bread and milk	-	-	-	-	3vi.

Same as first, but another meal, without barium, given before this one had all gone.

12.40. Shadow not well-defined; upper part light.

12.55. No shadow in left hypochondrium; transverse strip seen above umbilicus.

1.30. Strip smaller.

2.0. Stom. shadow gone. Empty in 3.30 hrs.

CASE XIX. G. M., age 3 years. *Two meals.*

First Meal at 9.55.

Barium	-	-	-	-	3iij.
Benger's Food	-	-	-	-	3vi.

12.50. Small deep shadow at pylorus, fainter at fundus, with a light area between.

1.35. Nodule at pylorus about size of a shilling; active peristaltic movement; the nodule became shaped like a dumb-bell, then one head separated, and the body and other became rounded, and still seemed about the size of a shilling.

1.55. Stom. empty in 4 hrs.

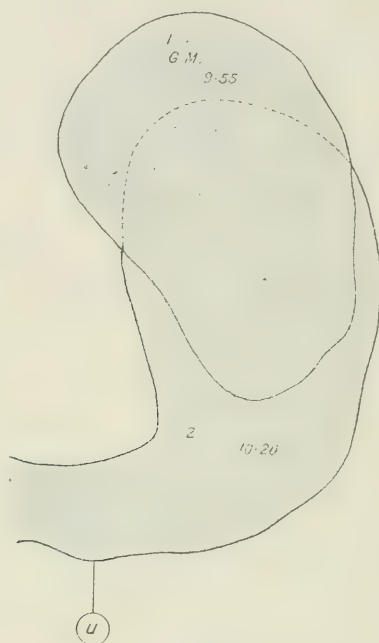
Second Meal at 10.30.

Barium	-	-	-	-	3iij.
Bread and milk	-	-	-	-	3vi.

3.15. Stom. not quite empty, large nodule seen at pylorus. It divided into two parts: three-quarters of the mass shot quickly downwards to the right, and it in turn divided into two, one part passing onwards, the other

going back to the quarter left at the pylorus, but not joining with it, for a distinct, though narrow, space separated the two nodules.

3.30. All gone from stom. Empty in 5 hrs.



Case XIX.

CASE XX. M. M., age $2\frac{1}{2}$ years. Two meals.

First Meal at 10.5.

Barium	-	-	-	-	3ij.
Bread and milk	-	-	-	-	3vi.

1.45. Stom. empty in 3.40 hrs.

Second Meal at 12.10.

Bismuth	-	-	-	-	3ii.
Bread and milk	-	-	-	-	3vi.

The shadow produced by the 3ii of bismuth has about same intensity as the 3ij of barium had.

4.50. Stom. empty in 4.40 hrs.

CASE XXI. A. W., age 5 years. Two meals.

First Meal at 10.5.

Barium	-	-	-	-	3ij.
Bread and milk	-	-	-	-	3vi.

2.5. Stom. empty in 4 hrs.

Second Meal at 12.5.

Bismuth	-	-	-	-	3ij.
Bread and milk	-	-	-	-	3vi.



Case XXI.

4.5. Stom. empty in 4 hrs.

CASE XXII. V. W., age 6 years. One meal at 12.20.

Barium	-	-	-	-	4 teasp.
Bread and milk	-	-	-	-	6 ozs.

5.0. Stom. empty in 4.40 hrs.

CASE XXIII. A. L., age 2 years. One meal at 10.45.

Barium	-	-	-	-	3ij.
Milk	-	-	-	-	3vi.

10.45. Gastric peristalsis begun as soon as examined.

3.30. Stom. empty in 4.45 hrs.

CASE XXIV. R. G., age 2 years. Two meals.

First Meal at 10.5.

Barium	-	-	-	-	3ij.
Milk	-	-	-	-	3vi.

3.25. Stom. empty in 5.20 hrs.

Second Meal at 12.35.

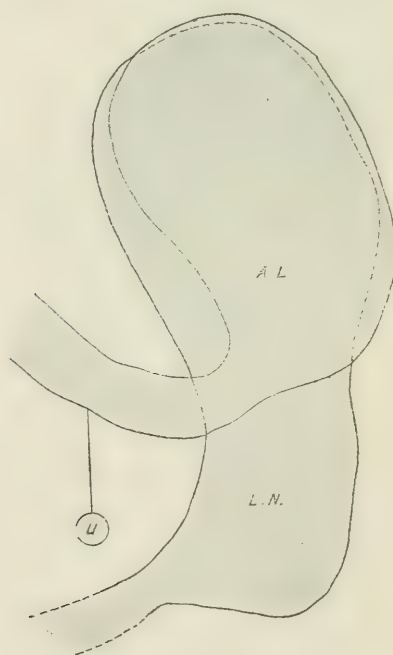
Barium	-	-	-	3ij.
Sugar	-	-	-	3ij.
Sodium citrate	-	-	-	gr. xii.
Milk	-	-	-	3vi.

5.0. Stom. empty in 4.25 hrs.

CASE XXV. L. N., age 6 years. *Two meals.*

First Meal at 10.15.

Barium	-	-	-	4 teasp.
Bread and milk	-	-	-	6 ozs.



Cases XXIII. and XXV.

10.15. Stom. in active peristalsis.

12.50. Indistinct rounded shadow high up in left hypochondrium.

2.50. Shadow more distinct, but now lower down in position of antrum; material seen passing out of pylorus rapidly.

3.15. Stom. empty in 5 hrs.

Second Meal at 1.5.

Barium	-	-	-	4 teasp.
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Ordinary dinner of mince, potatoes, and rice pudding, the barium being distributed throughout.

5.40. Stom. empty in 4.35 hrs.

CASE XXVI. M. J., age 5 years. *Two meals.*

First Meal at 10.30.

Barium - - - - 4 teasp.

Bread and milk - - - - 6 ozs.

10.30. Peristalsis present; material passing out of pylorus.

2.40. Only a trace at pylorus.

2.55. Stomach empty in 4.25 hrs.

Second Meal at 12.45.

Barium - - - - 4 teasp.

Mince, potatoes, and rice pudding (usual dinner).

5.0. Shadow not well defined; cannot be accurately traced; cardiac end seen more distinctly than pyloric.

5.35. Indefinite shadow of stom. still seen.

6.0. No shadow seen; stom. empty in 5.5 hrs.

CASE XXVII. J. B., age 5 years. *Two meals.*

First Meal at 10.10.

Barium - - - - 4 teasp.

Benger's Food - - - - 6 ozs.

2.10. Stom. empty of food in 4.0 hrs. Gas present.

Second Meal at 10.20.

Barium - - - - 4 teasp.

Cocoa (made with milk) - - 6 ozs.

1.20. Stom. empty in 3 hrs.

CASE XXVIII. V. D., age 2½ years. *Two meals.*

First Meal at 10.20.

Barium - - - - 4 teasp.

Benger's Food - - - - 6 ozs.

10.20. Stom. changing shape. No pylorus seen.

2.30. Nodule size of a shilling at pylorus, seen dividing repeatedly. Nodules passing across abdomen.

2.40. Stom. empty in 4.20 hrs.

Second Meal at 10.30.

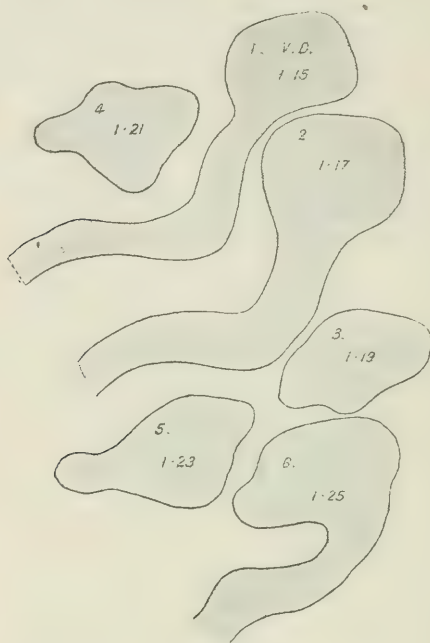
Barium - - - - 4 teasp.

Sodium citrate - - - - grs. xij.

Milk - - - - 6 ozs.

1.20. Very active peristalsis seen. The sod. citrate was dissolved in milk and barium added.

1.50. Stom. empty in 3.20 hrs.



Case XXVIII.

CASE XXIX. E. L., age 12 years. *Two meals.*

First Meal at 12.50.

Barium - - - - 4 teasp.

Mince, potatoes, and rice (usual dinner).

6.30. Stom. empty in 5.40 hrs.

Second Meal at 10.45.

Barium - - - - 4 teasp.

Bread and milk - - - 6 ozs.

A second meal, ordinary dinner, was given before first had all gone out of stomach. It had no barium in it.

1.5. Dim outline of whole of greater curvature seen, and a large nodule of pylorus. Seemed as though first meal had filled up the stomach, pushing residue on to pylorus, and leaving deposit of barium at curvature.

1.35. Stom. empty in 2.50 hrs.

CASE XXX P. T., age 12½ years. *Two meals.*

First Meal at 1.0.

Barium - - - - 6 teasp.

Mince, potatoes, and rice (usual dinner).

4.30. Stom. empty in 3.30 hrs.

Second Meal at 10.40.

Barium	-	-	-	-	4 teasp.
Bread and milk	-	-	-	-	6 ozs.

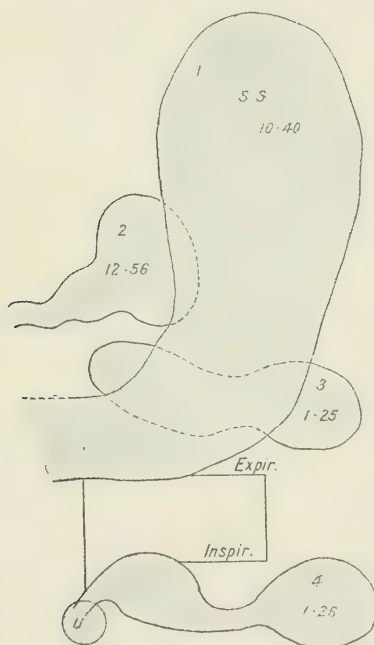
A second meal was given, without barium before the first had all left the stomach.

12.30 a.c. Shadow in gastric region, but not well defined.

1.0 p.c. No shadow seen in position of stomach. Empty in 2.20 hrs.

CASE XXXI. S. S., age 6 years. One meal at 10.40.

Barium	-	-	-	-	4 teasp.
Bread and milk	-	-	-	-	6 ozs.



Case XXXI.

2.30. Stom. empty in 3.50 hrs.

CASE XXXII. H. B., age 5 years. One meal at 10.45.

Barium	-	-	-	-	4 teasp.
Bread and milk	-	-	-	-	6 ozs.

2.45. Stom. empty in 4 hrs.

Case No.	Name.	Summary of Meals given.	Time taken by Stomach to empty.	Approximate Average Time of each.
			hrs. min.	hrs.
1	E. F.	Bi. - - - - Milk	4 -	
	"	Bi. - - - Paraffin; Milk	3 -	4
2	J. D.	Bi. - - - - Milk	3 25	
	"	Bi. - Barley water; Milk	2 -	
	"	Bi. - - Trumilk; Water	2 -	2 $\frac{1}{2}$
3	J. E.	Bi. - - - - Milk	3 20	
	"	Bi. - - - Paraffin; Milk	3 20	
	"	Bi. - - - - Benger's	2 40	
	"	Bi. - - - Trumilk; Water	2 -	2 $\frac{3}{4}$
4	M. B.	Bi. - - - - Milk	?	
	"	Bi. - - - Sod. citrate; Milk	?	
5	K. H.	Bi. - - - - Benger's	4 -	4
6	M. S.	Bi. - - - - Milk	3 15	3 $\frac{1}{4}$
7	T. W.	Bi. - - - - Benger's	4 15	
	"	Ba. - - - - Benger's	3 -	3 $\frac{1}{2}$
8	L. P.	Bi. - - - - Benger's	4 15	
	"	Ba. - - - - Benger's	3 -	3 $\frac{1}{2}$
9	P. D.	Bi. - - - - Benger's	4 -	
	"	Ba. - - - - Benger's	3 40	3 $\frac{3}{4}$
10	R. L.	Bi. - - - - Benger's	5 30	
	"	Ba. - - - - Benger's	5 -	5 $\frac{1}{4}$
11	L. M.	Bi. - - - - Benger's	3 15	
	"	Ba. - - - - Benger's	2 -	2 $\frac{1}{2}$
12	M. K.	Ba. - - Bread and milk	2 40	
	"	Ba. Paraffin; Bread and milk	3 30	
	"	Bi. - - Bread and milk	2 -	
	"	Ba. - Bread and milk + a second meal	3 20	3
13	L. K.	Ba. - Bread and milk	2 20	
	"	Bi. - - Bread and milk	2 -	2 $\frac{1}{4}$
14	E. P.	Bi. - - - - Milk	3 30	
	"	Bi. - - Lime water; Milk	2 15	3
15	C. M.	Bi. - - - - Milk	3 15	
	"	Bi. - - Lime water; Milk	2 20	2 $\frac{3}{4}$

Case No.	Name.	Summary of Meals given.	Time taken by Stomach to empty.	Approximate Average Time of each.
			hrs. min.	hrs.
16	E. C.	Ba. - - Bread and milk	4 -	4
17	F. C.	Ba. - - Bread and milk	3 40	
	"	Ba. - Bread and milk + a second meal.	3 -	3½
18	A. P.	Ba. - - Bread and milk	3 40	
	"	Ba. - Bread and milk + a second meal.	3 30	3½
19	G. M.	Ba. - - - Benger's	4 -	
	"	Ba. - - Bread and milk	5 -	4½
20	M. M.	Ba. - - Bread and milk	3 40	
	"	Ba. - - Bread and milk	4 40	4
21	A. W.	Ba. - - Bread and milk	4 -	
	"	Ba. - - Bread and milk	4 -	4
22	V. W.	Ba. - - Bread and milk	4 40	4¾
23	A. L.	Ba. - - - - Milk	4 45	4¾
24	R. G.	Ba. - - - - Milk	5 20	
	"	Ba. - - Sod. citrate ; Milk	4 25	5
25	L. N.	Ba. - - Bread and milk	5 -	
	"	Ba. - Mince, potatoes, rice	4 35	4¾
26	M. J.	Ba. - - Bread and milk	4 25	
	"	Ba. - Mince, potatoes, rice	5 5	4¾
27	J. B.	Ba. - - - Benger's	4 -	
	"	Ba. - - - - Cocoa	3 -	3½
28	V. D.	Ba. - - - Benger's	4 20	
	"	Ba. - - Sod. citrate ; Milk	3 20	3¾
29	E. L.	Ba. - Mince, potatoes, rice	5 40	
	"	Ba. - Bread and milk + a second meal.	2 50	4
30	P. T.	Ba. - Mince, potatoes, rice	3 30	
	"	Ba. - Bread and milk + a second meal.	2 20	3
31	S. S.	Ba. - - Bread and milk	3 50	3¾
32	H. B.	Ba. - - Bread and milk	4 -	4
III				

Nos. 1 and 4 were not counted, as being incomplete.

5 required	-	-	-	-	-	2 to $2\frac{3}{4}$ hrs.
12 „	-	-	-	-	-	3 „ $3\frac{3}{4}$ „
11 „	-	-	-	-	-	4 „ $4\frac{3}{4}$ „
2 „	-	-	-	-	-	5 hrs. or more
—						
30						111 hrs.

i.e., an approximate average of $3\frac{3}{4}$ hours.

SUMMARY.

From the practical experience that I have had, supplemented by a study of the literature having a bearing upon the subjects treated of in the thesis, I have formed the following conclusions:—

The shape of the stomach with contents in children is not a fixed one, but presents many differences during the process of digestion; the same stomach may show different forms at different times. As a rule, in infants the shape is more or less *globular*, becoming *elongated* as the child grows older; so that in many cases in the older children the stomach, when examined immediately after the ingestion of a meal, is somewhat of a “*f*” shape, and has some resemblance to a *Dutchman’s wooden shoe*, as suggested by Manders.

The foodstuff of which a meal is composed does *not* in itself seem to have much, if any, effect on gastric motility. The important thing is the degree of *fluidity* of the meal; the more fluid a meal is, the more quickly it will pass through the stomach.

The opaque substance used *has* an influence on the rate of evacuation of stomach contents.

Barium meals pass out of the stomach more quickly than similar meals containing bismuth.

Equal parts of milk and lime water are evacuated more quickly than an equal volume of milk alone; this I attribute to the decrease in specific gravity of the milk by the addition of the lime water.

Citrated milk goes through more rapidly than plain milk,

which may be due to a smaller curd being formed.

The stomachs of older children empty quite as quickly, on an average, as those of younger children, *if* a meal similar in bulk and consistence is given.

Some stomachs, when nearly empty, show a slowing in the rate of contraction, whilst others display an increased activity.

In some cases, the food begins to pass through the pylorus practically as soon as the meal has been taken, whilst in others there seems to be a resting stage before peristalsis commences.

If a second meal be taken before all the first has left the stomach, there may, or may not, be a mixing of the first residue with the second meal. When mixing occurs, it is not an intimate one throughout the whole mass. When the amount of intermixing is small, the residue of the first meal is pushed to the pylorus and most dependent part of the stomach, and may be evacuated sooner than if no second meal had been taken.

In my experiments, the average time for the stomach to become empty was $3\frac{3}{4}$ hours, and the majority emptied in from 3 to 4 hours.

Milk is *not* a suitable medium in which to give barium or bismuth, because it does not keep the powder uniformly suspended, but the addition of sugar assists in the suspension.

A semi-solid, such as porridge or bread and milk, or in case of infants a thick drinkable fluid like Benger's Food, is the most satisfactory medium.

Pure barium sulphate is the best opaque substance to use for X-ray work.

Although bismuth gives a deeper shadow than barium, if *equal* weights are administered, yet if $1\frac{1}{2}$ to 2 parts of barium for 1 part of bismuth are given, then the barium shadow is quite as intense as that produced by bismuth.

Four level teaspoonfuls of barium in a 6 oz. feed produce a satisfactory shadow.

Neither barium nor bismuth sets up intestinal disturbance of any kind.

From X-ray appearances, there is no evidence that

bismuth forms a coating for the intestinal mucous membrane, but it seems to be mixed up with the intestinal contents, and may probably be so on excretion. The intensity of the shadows of the nodules in the bowel in different planes was even greater than that of the mass in the stomach; this would not be the case, if the bismuth was separated out from the food and scattered along the wall of the bowel.

The stomach lies high up in the left hypochondrium in infants.

In the great majority of cases, the food passes through the pylorus intermittently, and in an apparently nodular form.

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RECENT WORK IN DISEASES OF THE LUNGS.

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MECHANICS OF BREATH SOUNDS.

A STUDY of the physics or mechanics of pulmonary acoustic phenomena—in other words, of the voice-sounds and breath-sounds over the lungs—has been elaborated by C. M. Montgomery and E. A. Eckhardt (10th Report of the Henry Phipps Institute, Philadelphia, 1915). These authors believe that the normal vesicular inspiratory sound arises within the lungs, as the air passes from the terminations of the smallest bronchi into the larger infundibula. Vesicular expiration, on the other hand, arises in the upper respiratory tract. The sounds of bronchial breathing originate largely in the upper respiratory tract, and so do those of cavernous and amphoric breathing. Discussing the transmission of sounds within the chest, they assert that diffusion and reflection are the agencies chiefly responsible for loss here, mainly the former. This essay is a painstaking effort to solve a number of obscure problems, that are for the most part open to attack only on the theoretical side, not by means of direct experiment; it will repay careful perusal.

SYPHILIS OF THE LUNG.

J. Blinder, *Medical Record*, New York, 1914, LXXXVI., 330, holds that syphilis of the lung occurs more frequently than is generally appreciated, and describes what he takes to be a case of syphilis of the hilus and base of both lungs, clearing up with rest in bed and antisymphilitic treatment, in a man with a strongly positive Wassermann reaction. Fourteen examinations of the sputum failed to detect the presence of tubercle bacilli; the case had been diagnosed as one of pulmonary tuberculosis. Skiagrams of the lungs before and after treatment are given, showing that the pulmonary infiltrations did clear up; there is nothing to prove, however, that the infiltration was due to the spirochæte of syphilis and not to other commoner infecting

agents met with in the lungs.

ACUTE ABSCESS AND GANGRENE OF THE LUNG.

I. J. Walker, *Boston Med. and Surg. Journal*, 1914, CLXXI., 49, discusses acute abscess and gangrene of the lung, pointing out that the distinction between the two may be very hard to draw both before and after death; their ætiology is identical. Males are two or three times as often afflicted as females, and the age is usually between 20 and 40. Walker goes over the variable symptoms that may be observed in these conditions, and deprecates the use of the exploring needle in the diagnosis, which can usually be made without its employment. Medical treatment is indicated in cases that are diffuse or bilateral; surgical intervention is called for in cases in which the abscess or gangrene is localized, not diffuse, and the patient fit to stand operation. Naturally, the course followed by any given case must be taken into consideration. Statistics from the medical literature of the last ten years show that of 132 cases of acute abscess of the lung the lesions were single in 104, multiple in 16; the mortality was 54 per cent. with medical treatment, 25 per cent. with surgical. Among 40 cases of acute gangrene, medical treatment had a mortality of 89 per cent., surgical treatment 44 per cent.

TREATMENT BY ARTIFICIAL PNEUMOTHORAX.

I. I. Lemann and U. Maes, *New Orleans Med. and Surg. Journal*, 1914, LXVII., 321, describe a case of pulmonary abscess in a coloured child of 11, a sequela of pneumonia and pleurisy, treated with considerable success by artificial pneumothorax. The treatment was still in progress, and had not reached the stage of cure.

A *résumé* of the treatment of phthisis by artificial pneumothorax, giving full details of its indications and execution, has been compiled by C. D. Parfitt and D. W. Crombie, *Canadian Med. Assoc. Journal*, Toronto, 1915, V., 277, 373, 489. They hold that the treatment of a severely affected lung may still be attempted when as much as one-third of the other lung is involved, and have employed it in 24 cases, all of bilateral disease, giving 180 inflations with nitrogen. No symptoms due to pleural shock or gas embolism were noted; the symptoms following inflation were irregular and trifling, as

a rule, such as cough, pain in the chest or neck, supra-orbital neuralgia, tightness in the chest or abdomen. Occasional subcutaneous and mediastinal emphysema occurred. The authors recommend the administration of morphia (gr. $\frac{1}{8}$ hypodermically) or some sedative half-an-hour before the puncture of the chest wall is made in nervous cases, and employ local anæsthetics freely at every puncture. Speaking generally, the patient should be in the horizontal position, and placed so that the site chosen for puncture comes uppermost. Full details as to the method of carrying out the puncture and inflation are given, with notes on the special difficulties that may arise at different points of these operations. The treatment is long, lasting from $1\frac{1}{2}$ to 3 years.

J. A. Lyon, *Boston Med. and Surg. Journal*, 1914, CLXXI., 329, records his experience of artificial pneumothorax as an associate treatment in pulmonary tuberculosis, giving a preliminary report based on 62 cases. He would limit its application to cases that do not respond to the usual sanatorium régime, to those with extensive or recurrent hæmoptysis, and to those in which the prognosis is bad irrespective of the stage of the disease. Bilateral cases in which the active disease on the untreated side is limited to the apex will, in many instances, show satisfactory improvement after being subjected to this treatment. He believes that it is applicable to only a very limited number of advanced cases of phthisis. Almost all his patients had bilateral disease. Usually 400 c.c. of nitrogen are injected at the first sitting; the amounts injected, however, varied from 50 to 1,700 c.c.

E. von Adelung, *California State Journal of Med.*, 1914, XII., 330, states that induced pneumothorax "should be used very generally in the treatment of pulmonary tuberculosis." He has tried it himself in 42 cases, failing to induce pneumothorax in only 5; 614 injections were given. There were no pleural reflexes or emboli, and pleural effusions resulted in 6 instances. All but one were well-advanced bilateral cases; 1 was cured, 29 were improved, and 8 were not benefited by the treatment.

BRONCHIAL ASTHMA AND HAY FEVER.

F. B. Talbot, *Boston Med. and Surg. Journal*, 1914, CLXXI., 708, discusses asthma in children, and its relation to the

anaphylactic phenomenon of "egg-poisoning," occasionally met with in the young—vomiting, diarrhoea, urticaria, and occasionally anaphylactic shock. During the last two and a half years, Talbot has studied eleven cases of egg-anaphylaxis; ten had had eczema in infancy or childhood, six had severe asthma. He quotes the experiment of Schloss, who found that in these hypersensitive children the white of egg, for example, rubbed into the cleaned unbroken skin of the arm, in a few minutes produced an urticarial wheal. The protein of other foodstuffs, in suitable cases, acted similarly. In less sensitive cases, Talbot scratches the skin, as for a von Pirquet tuberculin reaction, before rubbing in the egg-albumen. He gives details of six cases in which the presence of egg in the food brought on asthmatic attacks, and gave the typical skin reaction. Treatment, as he points out, may proceed on two lines. Either the food may be freed from egg or other substances producing the asthma; or the patient may be, in favourable cases, immunized by minute increasing doses of egg-albumen—from 1 to 500 milligrams of powdered dry white-of-egg in capsules twice a day. Care should be taken to start the dose below the limit of tolerance in this method of immunization. When the idiosyncrasy to egg-albumen is thus cured, the patient will be free from asthma, unless an idiosyncrasy to some other protein complicates the situation.

R. H. Babcock, *Journal Am. Med. Assoc.*, Chicago, 1915, LXIV., 2115, discusses the pathology of asthma, mainly from the new point of view of anaphylaxis, or undue sensitiveness to some specific protein or proteins. He holds that in many instances the source of the protein is some localized bacterial infection, in the gall-bladder or tubes, for example, or in the bronchi of cases with chronic bronchitis and asthma, or in the nose, accessory nasal sinuses, or teeth. He concludes that treatment should be by the injection of autogenous vaccines, prepared by culture from the infected spot, wherever that may be in the body. He quotes a case in which a mixed vaccine, obtained from the sputum and containing both aerobes and anaerobes, cured the patient. He does not say how long the cure lasted.

E. W. Andrews, *Ibid.*, 1914, LXIII., 1065, discusses the operative treatment of bronchial asthma by Freund's operation of chondrectomy, or excision of costal cartilages, usually the

second, third, fourth, and fifth. All traces of perichondrium are to be eliminated, in order that there may be no return of thoracic rigidity due to recurrence of the rib-cartilage. The operation is indicated when the emphysematous chest is expanded, barrel-shaped, and rigid; the two sides of the chest are operated upon in succession, and a long longitudinal incision is advised by Andrews. The operation was originally designed for the relief of extreme emphysema with rigid chest wall; it is of great service in properly selected cases of asthma.

S. Oppenheimer and M. J. Gottlieb, *New York State Journal of Med.*, 1915, XV., 214, give an account of hay fever (or pollinosis) and its treatment by active immunization. They supply a list of 15 graminaceous plants that may supply the pollen producing hay fever in spring, and of 12 dicotyledons and 1 graminaceous plant (maize) that provide pollen causing autumnal hay fever. They add that no doubt these lists are incomplete. The liability to hay fever is increased by abnormal conditions of the nose and by heredity. Their treatment consists in immunizing the patient, preferably for ten weeks before the hay fever is expected to occur, with increasing subcutaneous injections of saline extracts of the particular pollen to which experiment shows his skin is sensitive. This point is determined by performing a Calmette's or a von Pirquet's test, using pollen extract instead of old tuberculin; or a minute amount of pollen may be rubbed into a scarification, when a wheal will develop in a patient sensitive to that pollen. Numerous references to the literature are given.

TUBERCULOSIS.

C. Löwenhjelm and G. Nyström, *Nordiskt Med. Arkiv.*, Stockholm, 1914, XLVII., Kirurgi, H. 3, give a careful account of the indications for performing extensive thoracoplastic operations in tuberculosis of the lungs, with the technique and results of the operations. The object is to procure collapse and eventual healing of the affected lung; thoracoplasty has these advantages over artificial pneumothorax here—it succeeds in cases with adhesions that prevent the establishment of pneumothorax, and it requires no long after-treatment or repetition, whereas the pneumothorax treatment demands the services of a highly-skilled physician at intervals for

years. The operation of thoracoplasty is described at length; as a rule, it is desirable to remove several inches of each of the first ten or eleven ribs. Only 1 or 2 inches of the first rib can be resected, but 5 or 6 inches can be removed from the fifth to the eleventh ribs. The clavicle is left; local anæsthesia (novocaine and suprarenin) is advised. Much pain is felt after the operation, which may be followed by exacerbation of the tuberculous process, pneumonia, thrombosis, or sepsis. Details of four cases are given; it is noted that Sauerbruch, in 1914, recorded 132 such operations with 24 cures (one year later) and improvement in 78 cases. The authors also give some account of two other operative procedures for the cure of phthisis, namely, (1) *Plombierung*, "stopping" or filling of some part of the pleural cavity with some indifferent substance such as fat, vaseline, or paraffin; and (2) phrenicotomy, division of the phrenic nerve in the neck on the affected side in order to give rest to the tuberculous lung by paralysing the corresponding half of the diaphragm. Phrenicotomy may be used as an adjunct to thoracoplasty or pleural stopping.

P. A. Lewis and C. M. Montgomery, *Journ. of Experim. Med.*, 1913, XVII., 527, describe the tuberculous bronchopneumonia produced by the introduction of large amounts of bovine tubercle bacilli through the air-passages into the lungs of dogs. They found that extensive ramifying cavities might be formed in as little as three weeks.

G. Fetterolf, *Trans. Amer. Laryngological Assoc.*, 1914, has made a careful examination of the larynx in the bodies of a hundred phthisical patients dying at the Henry Phipps Institute of the University of Pennsylvania. Gross tuberculous lesions of the larynx were found in 83 cases, doubtful lesions in 4, and only 13 had no laryngeal disease. The epiglottis was involved in at least 59 instances, the aryteno-epiglottic folds in 58, both usually with infiltration and less often with ulceration. The ventricular bands were tuberculous in 42 patients, on both sides in 38; the vocal cords in 49, bilaterally in 42 of these.

B. H. Waters, *Med. Record*, New York, 1915, LXXXVII., 263, gives a very favourable account of his treatment of phthisis by prolonged inhalations of oxypinene. Pinene, $C_{10}H_{16}$, is the chief constituent of turpentine; oxypinene is described by

Waters as an ozonide, formed by exposing pinene to a current of dry air ozonized by the high tension electric discharge, and it is said to be less irritating to the tissues than pinene. It can be inhaled from a mask for many hours a day without harm. It acts as an expectorant and mildly stimulating diuretic, and as a hæmatinic. Waters says nothing about its action on the tubercle bacilli in phthisical lungs, but believes that it lessens the severity of secondary bacterial affections; it is of great value in the relief of dry, ineffectual cough, in lowering the temperature, and in improving the general condition of patients with extensive tuberculosis of the lungs.

J. H. Pryor, *New York State Journ. of Med.*, 1915, XV., 208, gives an account of Rollier's heliotherapy for tuberculous lesions of bones or surgical tuberculosis, as practised at Leysin in Switzerland at an altitude of 4,200 feet since 1903; Rollier now has 700 patients under treatment there. Details of the gradually increasing exposure of the patients to the sunlight are given, the object being to tan the patient and finally the diseased part as completely as possible without producing sun burns or dermatitis. Pryor describes the introduction of this heliotherapy into the Adam Hospital at Perrysburg, N.Y., at the end of 1913. In May, 1915, 65 tuberculous patients were undergoing the treatment. The results are described as surprisingly good throughout, even mobility returning in cases in which the tuberculous joints were apparently firmly ankylosed. Pain, fever, swelling, inflammation, purulent discharges, all tend to disappear rapidly; the blood-count, appetite, and general condition improve. Surgical interference and the use of dressings are much reduced.

J. B. Holmes, *Johns Hopkins Hosp. Bull.*, Baltimore, 1915, XXVI., 12, has experimented on the hypersensitiveness to minute intracutaneous injections of tuberculin shown by phthisical patients at different stages of their pulmonary tuberculosis. Control injections of normal saline and carbolic acid produced a mild "traumatic" reaction, that reached its maximum in 24 hours and had quite disappeared in 48; hence, the results of the tuberculin injections were not recorded till 48 hours after the injections had been made. The patients, 80 in number, had 550 tests made upon them; all were under institutional treatment. The tests were made at intervals of 14 days. The doses of tuberculin varied from $\frac{1}{100000}$ mg.

upwards; the tuberculin employed was human bouillon filtrate, apparently. Holmes concludes that phthisical patients present marked hypersensitiveness to tuberculin soon after the clinical onset of the disease. If they improve, this hypersensitiveness diminishes; if they do not improve, it fluctuates or remains stationary. In more advanced cases, it reappears in times of exacerbation, rising or falling as it follows more or less closely the clinical course of the disease. Towards death it may rise much higher, and then fall until it fails entirely.

O. J. Rogers, *Boston Med. and Surg. Journal*, 1915, CLXXII., 161, has followed out in August, 1914, the history of 69 children aged ten and under, who gave a positive von Pirquet reaction in the wards of the Massachusetts General Hospital, between July, 1910 and July, 1913. He tabulates the results of his investigations. He concludes, that if a positive skin-reaction is obtained before the age of two, it is likely that the child's life will be short; 15 out of 18 such children were traced, 11 were dead (8 of tuberculosis), 4 were alive and free from tuberculosis. The mortality of all children up to the age of ten, who react to the von Pirquet test, is much higher than that of normal children. It is noted that the diagnosis of "miliary tuberculosis" was made on clinical grounds in a child of four, who did badly in hospital and was removed and sent a sea journey. Three and a half years later he was reported by his mother to be well and strong.

S. H. Habershon, *Bristol Med.-Chir. Journal*, 1914, XXXII., 97, gives a full and interesting account of the secondary infections of pulmonary tuberculosis and their treatment by vaccines, with reports and charts of a number of cases observed by himself. He argues that too little attention is paid to the secondary complications of phthisis, and that many of the more acute symptoms are not infrequently attributed to the tuberculous invasion, when in reality they are due to the secondary infection. For example, a pneumonia due to Fraenkel's pneumococcus may fail to clear up, because it sets going a pulmonary tuberculosis or awakens a latent pulmonary tuberculosis into activity; contrariwise, pulmonary tuberculosis is habitually complicated in its later stages by secondary infections, and these may produce special symptoms or signs leading to their detection. Attacks of bronchial asthma may be associated with secondary

infection by the *Diplococcus pneumoniae* or *Micrococcus catarrhalis*, and the appropriate vaccine treatment of such patients may be very successful. Vaccines made from Friedländer's *Pneumobacillus* have also effected great improvement in suitable cases. There appear to be no criteria enabling a correct choice of vaccine to be made in patients with secondary infection of the lungs by bacteria of several varieties; the organism preponderating in the sputum is not necessarily the chief offender.

An elaborate statistical "Report on the After-Histories of Patients discharged from the Brompton Hospital Sanatorium at Frimley in Surrey, during the years 1905-1910" (Junior Army and Navy Stores, Aldershot, 1914, price 2s. 6d.), deals with 1,674 phthisical patients treated at the Sanatorium during that period, and followed out up to the end of 1912. The patients admitted each year are divided into four classes for purposes of statistical comparison, according as their sputum did or did not contain tubercle bacilli, on the one hand, and according as they stayed for longer or shorter periods under treatment at the Sanatorium. It is quite impossible to give an adequate *résumé* of the 36 tables constituting this valuable book; one important conclusion at which its authors (S. H. Habershon, F. J. Wethered, P. Horton-Smith-Hartley, J. J. Perkins, and W. O. Meek) arrive is that "there can be no doubt that to ensure the maximum benefit from Sanatorium treatment, efficient 'after-care' and supervision are essential."

G. Hinsdale has written an excellent essay on "Atmospheric Air in Relation to Tuberculosis" (Smithsonian Institute Publications, No. 2254, Washington, D.C., 1914), freely illustrated with photographs showing the way in which the open air life and heliotherapy are applied at the present time to the treatment of phthisis and other forms of tuberculosis in various countries. Special attention is paid to the climatic influences that are supposed to influence the progress of tuberculosis for good or evil. The book should be of great service to all who have to do with the care, treatment, or after-care of tuberculous children or adults. The illustrations are most useful.

MISCELLANEOUS.

P. Schoonmaker, *New York State Journal of Med.*, 1915, XV., 100, gives a brief account of the bronchoscope, narrating

a number of cases in which he has employed it for the removal of foreign bodies from the bronchi, trachea, and œsophagus. Anæsthesia is, of course, required, and the author speaks highly of chloroform, administered per rectum for choice, in these cases. He recommends the use of his own improved form of bronchoscope, of which no details are given.

J. M. MacBean Ross, *Edinburgh Med. Journal*, 1914, N.S., XIII., 444, gives an account of 60 cases of primary new growth in the mediastinum, studied both ante- and post-mortem at the Brompton Hospital for Consumption. Between 1900 and 1913, 80 such cases were admitted, 1 in every 259 admissions. Two cases were under 20, 7 were aged 20-30, 14 were aged 30-40, 28 were aged 40-50, and 9 were more than 50 years old; the extremes were aged 18 and 70. The men were 41 in number, the women 19; 23.5 per cent., gave a family history of malignant disease, 31.6 per cent., a tuberculous family history. The sputum contained tubercle bacilli in 2 cases, but evidence of phthisis was found post-mortem in 25. In 41 of the cases the growth originated in the anterior mediastinum. The growth was a sarcoma in 44 instances, a carcinoma in 10, and unclassified in 6. The lungs themselves were invaded in 56 cases, the right lung alone in 29, the left alone in 13, both in 14. Metastases, usually in the liver, pancreas, and suprarenals, were observed in 44 cases. The symptoms were very various in the 60 patients; emaciation was not the rule, nor was fever in the absence of complications; but pressure symptoms, pain, a disproportionate amount of dyspnœa, hoarseness from pressure on the recurrent laryngeal or vagus nerve, miosis, and in particular sudden œdema of the face or neck, were among the most important symptoms commonly observed. Hæmoptysis occurred in two-thirds of the cases, and was the cause of death in three. Pleural effusion appeared in half the cases, and was obviously hæmorrhagic in half of them; cancer cells were found in the fluid in three instances. Often, too, there was a high percentage of lymphocytes. The duration of the cases varied from 9 to 88 weeks, averaging 32; death was due to exhaustion in 43 cases, asphyxia in 11, hæmoptysis in 3, cardiac failure in 2, and cerebral tumour in 1.

H. W. Gardner, *Birmingham Med. Review*, 1915, LXXXVII., 97, gives a practical account of the general treatment of

pneumonia. A small epidemic of 23 cases, among young territorials at Shrewsbury in August, 1914, was satisfactorily treated by allowing a very copious fluid diet, exposure to the fresh air of spacious balconies, rest as complete as possible, and medical treatment on expectant lines. Gardner advises that at the outset of any case of pneumonia a stick of silver nitrate should be used to mark out accurately the positions of the cardiac apex, the right border of the cardiac dulness (superficial and deep), and the lower border of the liver dulness. In this way, change of position or dilatation of the heart can be made out early with certainty. He thinks an initial dose of calomel is always beneficial; the importance of preventing sleeplessness is great. Failure of the right side of the heart should be met by leeches, or preferably, by bleeding; he has never seen digitalin do any good.

J. L. Miller, *Amer. Journal Med. Sci., Philadelphia*, 1914, CXLVIII., 469, discussing the clinical value of expectorants, comments on the practical impossibility of obtaining direct proof here from observations made on human beings. He argues that the expectoration of mucus from the lungs may be facilitated by (1) increased coughing; (2) increased ciliary activity; (3) diminution in the viscosity of the bronchial mucus; or (4) stimulation of the peristaltic movements alleged to occur in the alveoli and smaller bronchioles. There is no reason to suppose that drugs given by the mouth can affect either (2) or (4) above. It is commonly held that the expectorant action of ammonium carbonate and chloride is due to their elimination through the bronchial mucosa, the alkali thinning the secretion. But it appears that from half to four-fifths of the ammonia administered disappears in the liver, and never reaches the systemic circulation. Another view is that these salts act upon some nervous centre for the bronchial glands, increasing the expectoration. Miller describes his own experimental work upon the action of expectorants upon anæsthetized dogs with open tracheas. They show that moderate doses of ammonium salts, emetin, and apomorphin, do not increase the tracheal secretion of mucus under the conditions of experiment.

CEREBRO-SPINAL FEVER.*

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CEREBRO-SPINAL fever is a disease which both the layman and the medical man have always rightly regarded as being surrounded with a certain sense of mystery, and an examination of the clinical and pathological data will readily show the reason for this. Yet there are diseases, some of them considered quite commonplace, such as pneumococcal infections, the pathology of which is at least as mysterious as that of cerebro-spinal fever.

A complete investigation of an infectious disease, from a pathologist's point of view, involves a knowledge of the identity and habits of the causal organism, of the mode in which infection originates and is carried from place to place, as well as from one subject to another, of how the parasite takes root in the body, on what systems of the body its harmful effects are chiefly felt, and by what means the

* Based on a lecture given at the North-East London Post-Graduate College.

victim seeks to combat the invader. Unfortunately, in many of these respects an adequate explanation of the disease is not forthcoming. It has also usually fallen to the lot of the pathologist, as a result of his previous inquiries, to attempt to provide what has been called a rational means whereby the human organism may either be rendered immune or, being infected, may be aided in repelling the invader. He thus has a duty less to the patient than to the medical practitioner treating him, and hence it is my intention now not so much to discuss what has to be done and how to do it, but rather to try and give a concept of the disease processes, which will enable the practitioner to suggest how these may best be countered.

I. THE BACTERIA.

The bacteriological history of the disease is of considerable interest. The earliest observations were made by Lichtenstern, who, in 1885, discovered diplococci in films of the cerebro-spinal fluid. In cultures from the fluid, however, he grew both cocci and bacilli. This occurred during a small epidemic at Cologne in the early days of bacteriology, and, hence, we cannot be certain what any of these organisms were. In 1887, the researches of Weichselbaum resulted in the identification of the *Diplococcus intracellularis meningitidis*, or meningococcus of the now familiar type. He isolated this organism in some half dozen sporadic cases, which were not associated with an epidemic of the disease. It is interesting now to note that Weichselbaum, despite continued research during the next eight years, entirely failed to isolate the meningococcus again. In 1895, that is to say at the end of this long negative period, a Gram-positive diplococcus was isolated by Jaeger, and this finding was confirmed by Heubner, who discovered the organism of Weichselbaum in some cases, and that of Jaeger in others. These organisms were considered to be identical, and each of them, when injected into the meninges of suitable animals, caused acute meningitis.

It was at length decided that the diplococcus Crassus, as the organism of Jaeger and Heubner was called, was not identical with the meningococcus, and that it might be found growing as a saprophyte in the normal pharynx. Strangely enough, however, it has been found to be present in the

meninges in various forms of meningitis, including tuberculosis of the meninges. The diplococcus Crassus thus has a very curious record. It would be useless to speculate on it at present, but we may note the fact that it presents some characteristics similar to those of the meningococcus, not the least important of which is a capacity for appearing in the meningeal system from time to time.

More recently, workers on this disease have described Gram-negative cocci obtained from the meninges, but showing marked cultural and morphological variations from the meningococcus of Weichselbaum, as well as cocci morphologically similar to the meningococcus, but differing in their reactions on sugar containing media, and in their reaction towards Gram's stain, to which some of the cocci gave a positive and some a negative reaction. In addition to this, the presence of Gram-negative bacilli, bearing no clear relation to the Coli-typhoid group of organisms, has very frequently been observed and isolated, especially during the recent epidemic in this country. Lastly, it must be added that it is by no means uncommon for a careful examination, both by films and cultures, to fail in demonstrating either the meningococcus or any other organism in the purulent cerebro-spinal fluid; and this, too, in a characteristic case of meningitis occurring in an epidemic, when meningococci may be present in the pharynx.

From this bacteriological conflict the meningococcus of Weichselbaum has emerged victorious, and, with but few dissentient voices, now holds its own as the cause of the various forms of cerebro-spinal fever. The orthodox attitude to-day towards the bacteriology of cerebro-spinal fever is to discard as irrelevant anything obtained in culture which is not the meningococcus. For the present, we cannot say whether this attitude is justifiable, but we shall examine later on to see how far the meningococcus fulfils the rôle implied by its presence in the cerebro-spinal fluid.

For the present, then, we have one well-established fact, the fairly constant association of the meningococcus with the disease, on which to found our further inquiries. Before leaving this subject, therefore, it would perhaps be well to mention certain peculiarities in the morphology and staining reactions of the meningococcus, to which reference may be

made later on, and to describe its chief cultural properties, since these determine whether the organism can or cannot be obtained in culture.

The essential cultural features can be given in a few words. The meningococcus requires to be kept moist, never to be exposed to cold, and to be planted out on a richly albuminous medium. From this, it is obvious that a throat swab, for example, sent by post for bacteriological examination, is very unlikely to yield the meningococcus in culture. It is a matter of importance to know that, in actual practice, swabs are best taken by means of a wire carried into the mouth in a curved glass guarding tube. The wire should be extruded into the nasopharynx, and withdrawn again into the sheathing tube before being removed from the mouth. From these swabs, nasgar or glucose ascitic agar plates should at once be inoculated. The plates should be kept warm, generally by means of a hot water bottle carried in the bag, until they can be put into the incubator.

Owing to certain peculiarities of morphology and staining capacity, the meningococcus is rather sharply marked off from most other coccal forms. In the first place, in cultures one finds marked variation in point of size, large giant forms, the so-called involution forms, being fairly constant. Of the classical type of meningococcus, all forms are gram-negative, but the various elements differ greatly in the degree to which they take up the counterstain. This is possibly a matter of age and autolytic action, although it is quite well marked in 48-hour cultures. Moreover, this organism survives but a very short time in artificial culture, unless it is repeatedly subcultured to fresh medium.

These three characteristics may suffice to show the variable and unstable nature of this organism. One further matter which needs to be mentioned is its pathogenic effects on animals. These effects on most ordinary laboratory animals, including monkeys, are relatively slight, and quite inconstant so far as toxic action is concerned. Moreover, in order to cause meningitis, it is necessary that the organism should be artificially introduced into the meninges. It then produces an acute inflammation. But it need hardly be pointed out that this is not a specific effect, since most other organisms would

act in the same way.

2. CLINICAL ASPECTS OF THE DISEASE.

Let us now see from what situations in the body we may recover the meningococcus. For this purpose, we must briefly review the clinical aspects of the disease, observing where localizing signs present themselves and indicate the seat of infection. Investigations, made during the recent epidemic of cerebro-spinal fever amongst the British troops in this country, have shown that the clinical symptoms may be divided into three types, which, to some extent, probably represent the stages of the disease.¹

(a) *Catarrhal*.—A localized infection of the pharynx.

(b) *Septicæmic*.—A generalized infection of the body through the blood.

(c) *Meningitic*.—A specialized infection of the meningeal system.

(a) *Catarrhal*.—In the catarrhal stage, there is usually a definite acute pharyngitis of a dry type. According to the investigations mentioned above, this is in the first instance a streptococcic infection, though subsequently the meningococcus is found in great numbers, especially in the naso-pharynx adjacent to the sphenoidal air sinuses. The catarrh, as a rule, clears up fairly soon, if it does not go on to a generalized infection, though there is a third possibility that it may persist. In this last case, the patient becomes a carrier—a state we shall discuss later.

(b) *Septicæmic*.—The septicæmic stage is almost always preceded by the local pharyngeal infection. When well established, it presents little to distinguish it from other acute septicæmias, except perhaps the relative frequency of an exanthematous rash, or of herpes facialis.

(c) *Meningitic*.—In the meningitic stage, the symptoms in acute cases are those of a diffuse cerebro-spinal meningitis, but in chronic cases, principally those of a posterior basic infection. As to the time of onset of this stage in relation to the generalized infection, it is a matter of doubt whether the meningitis precedes the blood infection and perhaps leads

¹ Lundie, Thomas, Fleming and MacLagan, *B. M. J.*, May 15, 1915, p. 836.

to it, or whether the meninges are infected from organisms derived from the blood stream; a point to which we must return later. Before leaving the clinical aspect, one question arises, which demands, if possible, a clear answer. What is to be regarded as the incubation period of this disease, that is to say, the period that must elapse between the exposure of a person to infection and the time when he may be regarded as free from the possibility of contracting the disease? This is at present a matter of doubt, but it is usually accepted that, if a person who has been exposed to infection is not at the end of a fortnight harbouring the meningococcus in his throat, he may be regarded as safe.

3. RELATION OF THE MENINGOCOCCUS TO THE CLINICAL LOCALIZATIONS
OF THE DISEASE.

We can now pass on to the relations of the meningococcus with these various manifestations of the disease, considering the presence of the meningococcus in—

- (a) the pharynx,
- (b) the blood,
- (c) the cerebro-spinal fluid.

(a) *Pharynx*.—In the case of persons actually suffering from cerebro-spinal fever, according to most opinions, the meningococcus can, as a general rule, be isolated from the throat in the early days of the acute disease. It is most frequently obtained during the first week, and is usually extinct by the end of the third. Throat examination thus constitutes a tolerably safe method of diagnosis in early cases, and in conditions in which lumbar puncture is not yet indicated. In the case of healthy persons who have not come in contact with the disease, the meningococcus appears to have been found, but so rarely that we may fairly conclude that it is not a normal inhabitant of the throat in health. In the case of apparently healthy persons who have been in contact with the disease and who are known as primary contacts, the number of those from whose throats the meningococcus has been isolated has varied greatly in different hands and in different epidemics, varying from about 2 or 3 per cent. up to 30 or 40 per cent.

Carriers.—A person harbouring the meningococcus in the

throat for a longer or shorter period is known as a carrier. The infection has most likely been derived from an acute case of cerebro-spinal fever in its earliest stages, but presumably, too, it may have been derived from contact with a carrier, who is suffering only from the local pharyngeal infection.

Carriers fall into three classes: temporary, periodic, and permanent. The temporary are those in whom the infection persists for only a few weeks. In the permanent carrier the organisms may be present in the pharynx in great numbers after many months, despite energetic and continuous measures to eradicate them. There are certain general conditions which make for an increase in the number of carriers, such, for instance, as cold and wet weather, which in themselves lead to catarrh, and thus prepare the ground for meningococcal infection. These conditions, too, lead to the crowding together of people in close warm places, where infection readily passes from one to another in the processes of speaking and coughing. Above and beyond all this, however, is a further factor which seems to lie more in the nature of the seed than of the soil. It is the case that, as the virulence of the epidemic rises, so each succeeding cerebro-spinal fever patient is found to be associated with an increasingly large number of carriers. In other words, it appears that the virulence of the organism increases in its passage from victim to victim, and the organism acquires at the same time the power of implanting itself more readily in the mucosa of the normal individual's throat.

Generalization of the disease in carriers. — For a known established carrier to become affected with acute cerebro-spinal fever is a rare phenomenon. This is not in itself astonishing, if we assume that a local immunity has been set up during the course of the infection, because we know when this occurs the disease process seldom spreads spontaneously beyond this area. What is very astonishing is, that the primary contact, that is, the person in direct contact with the cerebro-spinal fever patient, is said to be attacked very seldom; on the other hand, it is said to be the secondary contact, that is the one coming in contact with the carrier, who is liable to become affected with the acute disease. This sort of statement is one that must be made with the greatest care in the absence

of very full statistics to substantiate it, for we must remember that primary contacts are relatively rare, whilst secondary contacts may be legion ; so that whilst the numbers are widely different, the relative incidence of the disease in both primary and secondary contacts may be the same.

In discussing the question of carriers in this disease, as contrasted with the carrier condition in other diseases, such as typhoid or diphtheria, we find some difficulty in drawing a comparison between them. In typhoid and diphtheria, the carrier has almost invariably suffered from the disease, and presumably for that reason, the host is able to tolerate the presence of the organism without receiving further harm from it. In cerebro-spinal fever, as far as we can see, this previous generalized effect, resulting in the subsequent immunity of the carrier, has not usually been present. How then is he protected? We may suppose that the slight degree of catarrh of the pharynx, which usually exists, has resulted in the production of a degree of local immunity sufficient to prevent the spread of the organisms beyond this sphere. This is quite a feasible supposition, and is the basis on which a good many problems of immunity are explained. On the other hand, it has been suggested by Hort and others that the meningococcus, as we know it, is too inert to act as a pathogenic agent ; experiments on animals support this contention.

The position is, perhaps, closely allied to what obtains in the spread of pneumococcal infections, except that the pneumococcus is widely spread in the apparently normal respiratory tract, and is a much more common cause of catarrh. With the pneumococcus, as with the meningococcus, the organism may be transmitted from person to person, and result, as a rule, in nothing more than a catarrhal condition. Every now and again, however, for reasons which we do not understand, the disease assumes a generalized form ; the infected person gets pneumonia, and possibly an acute meningitis as well. What is the cause of this sudden activity of an apparently inert organism? As we understand the phenomena at present, they leave on the mind the impression either that there must be an enormous difference among people as regards immunity to the meningococcus, or that the organism receives from the host who becomes infected some form of activating stimulus,

which entirely alters its characteristics, or else that the meningococcus, as we know it, is only associated with the disease, and is not the actual cause of it.

(b) *Blood*.—We now leave the bacteriological findings in the pharynx, and turn to those of the blood in acute cases. Examination of the citrated blood, by laking and throwing down in the centrifuge, will suffice as a rule, to demonstrate the presence of a few typical meningococci. The culture of the organism, however, is not so readily carried out, although some writers claim that 30 per cent. of the cases give positive results in their hands. The exact cultural technique which gives the best results is a matter of individual choice, but for our purpose the manner first indicated, of showing whether or not the organism is present in the blood, is of greater moment, since the nature of the disease will probably have been identified already by other means. All the results of blood examination have pointed towards the same conclusion, which is that the meningococcus is only very scantily present in the blood at any time, that it remains there only for a brief period, and that, in a very large number of clinically typical acute septicæmic cases, its presence cannot be demonstrated at all. Various bacillary forms, and some of the atypical cocci we have just discussed, have occasionally been found in the blood in acute septicæmic cases; what their significance is, we do not know at present.

(c) *Cerebro-spinal Fluid*.—We have already seen that various bacteria have been obtained from the cerebro-spinal fluid, and we need here only discuss the meningococcus of Weichselbaum. This organism varies greatly as regards the numbers in which it is present in the fluid. Sometimes, it is only with the greatest difficulty that one or two diplococci can be demonstrated, whilst in other cases none at all may be found. In still other cases, the phagocytes may be found absolutely stuffed with the cocci, and large masses may be present lying free in the fluid. As we shall see in discussing prognosis, these large numbers of organisms do not indicate that the disease will follow a very acute course—rather the contrary. The cocci are, perhaps, more constantly found in the first tapplings and tend to disappear later on, but this is by no means a constant finding. The meningococcus is

an organism which very rapidly undergoes autolysis, and this is often given as the reason why only a few cocci may be found in the fluid in some very acute cases with very pronounced purulent meningitis.

4. TRANSMISSION OF THE DISEASE.

Having discussed the question of where the bacteria are to be found, we have now to settle how they first make their entrance into the body, and how they are carried from one organ to another. The rationale of these different phenomena is no mere academic question, but one to which every practitioner must apply himself, inasmuch as it may be possible to arrest the disease at some point in its course, if we should fail to prevent its inception.

(a) *Implantation in the Pharynx*.—Starting with the assumption that an entrance is effected *via* the mucosa of the pharynx,¹ we have to discuss how the infective agent may reach the meningeal system. The first and most obvious way is a direct entrance into the cerebral meninges, owing to suppuration having been set up around and through the sphenoid bone. This type of meningeal infection by direct spread has been described in one or two cases recently.² It is more prone to occur in children, in whom there is more adenoid tissue in the sphenoidal region, and therefore more tendency to obstruction of the sphenoidal air sinuses. Apparently, however, it is not the common mode of infection, since this local abscess in relation to the meninges is not often seen. Nor would this mode of infection explain the very sudden onset of an acute diffuse meningitis of both brain and cord occurring in an apparently healthy person.

(b) *Entrance into the Blood*.—In cases that are affected in this manner, we can readily understand the occurrence of a blood infection following on meningeal infection, because we know from animal experiments that, when bacteria are introduced into the spinal theca, they easily find their way out into the blood from the inflamed and damaged meninges. This would be a septicæmia secondary to meningeal infection ;

¹ It is no doubt possible that the infective agent may enter the system by the agency of lice or by the swallowing of infective material, but of these methods of infection we at present know too little for them to be profitably discussed.

² Embleton and Peters, *Lancet*, May 22nd, 1915, p. 1078.

whereas the clinical symptoms point, as a rule, to blood infection as a preliminary to, or even quite distinct from, meningitis. In addition to this method of direct spread, we can only say that it is not uncommon for an acute sore throat, especially of a streptococcal form, to lead to septicæmia. The bacteria presumably gain entrance through local tissue necrosis, and it is quite likely that meningococcal infection of the blood takes place in the same way, especially as it is said to be frequently complicated by the presence of a streptococcal catarrh. Infection of the blood then in certain cases, in which there is an acute pharyngeal catarrh, may readily be explained.

(c) *Entrance into the Meninges.*—We have seen how this may, in rare instances, occur by direct spread through the sphenoid bone. In the ordinary epidemic form of the disease, however, we are apparently confronted with quite a different problem. The sudden onset of an acute and diffuse meningitis of brain and cord makes it appear probable that the infecting agent has been carried to the meningeal system in the blood stream. What evidence is there for and against this method of infection? In favour, is the fact that we know the meningococci to be present in the blood; against it, that the cocci are present in the blood only in very small numbers, and, as far as we can see, not in all cases. Then again, there is the much more serious objection, that the meningococcus is a fairly large organism. How can it gain access to the meningeal sac from the blood? The filtering mechanism, that separates the vascular from the meningeal system, is so fine that even the large albuminous molecules in the blood-plasma cannot pass across to the cerebro-spinal fluid.

A septicæmia, in which an abundance of organisms of various kinds circulate in the blood for weeks and months, is not very uncommon, but for these organisms to set up meningitis is exceedingly rare. That these organisms fail to set up meningitis is not because meningitis can only result from certain specific organisms, but presumably because the organisms are not able to enter the meningeal system. It has been suggested that meningococci may be carried into the meninges by phagocytes, but it is difficult to see why the phagocytes should enter, unless there is first some positive chemotactic influence within to attract them. Again, the numbers of organisms so introduced, if we can judge by animal

experiments, would only be sufficient to set up a meningitis of a very chronic type, and not the acute form that we are discussing here.

If we try to find an analogy among other meningeal infections we get very little help. In the case of tuberculosis, the difficulty of penetrating the meningeal filter is got over usually by the bursting of a miliary abscess into the meningeal space. This is an entirely different matter. On the other hand, in pneumococcal meningitis the manner of infection of the meninges seems to be so similar to what obtains in cerebro-spinal fever that we get no assistance. To explain this anomaly of the apparent penetration of the meningeal filter by large organisms, it has been suggested by Hort that the meningococcus may exist in other forms than that in which we know it, and that in some form it may be sufficiently minute to pass through a filter. Some evidence has been produced in support of this, but the suggestion at present awaits confirmation. If it were confirmed, it would explain among other things the apparent absence of the meningococcus from both the blood and the cerebro-spinal fluid in certain acute cases. It might explain, too, the source and nature of some of the various and differing organisms, which have at times been isolated from the blood and cerebro-spinal fluid.

5. POINTS IN PROGNOSIS.

Examination of the cerebro-spinal fluid itself, when there is acute meningitis, shows the presence of a very large amount of albuminous matter. As the disease progresses to a favourable termination, the amount of albuminous matter steadily diminishes, and these observations form a fairly reliable guide to the course that the disease is taking. The fact that quantities of serum may be introduced at frequent intervals into the theca does not vitiate this test, because the foreign serum very rapidly passes out from the meningeal into the vascular system.

Bacteriological findings.—The number of organisms, that is to say of meningococci, present in the fluid at the first examination is certainly no absolute guide to the severity of the attack. In some of the most severe cases, when pus is abundant, the meningococcus may be almost entirely absent. On the other hand, some cases, in which the fluid and pus cells

contain enormous numbers of cocci, run a very favourable course. Indeed, in a very chronic case of three months standing, in which there was no fever whatever after the first week or two, and death apparently only occurred as a result of chronic hydrocephalus, the fluid contained throughout enormous numbers of meningococci. Apart from these statements, however, it may be taken as a general rule that, in those cases in which there are many cocci present at the first examination, they will rapidly diminish as a result of successful serum treatment.

Cytological changes.—In a typical case of meningitis of the acute type, the cerebro-spinal fluid is markedly turbid, and often definitely purulent. Films made from the fluid, and stained by the method of Jenner or Leishman, show very large numbers of polymorphonuclear leucocytes, many of which are in advanced stages of degeneration. There may be also a certain number of lymphocytes present. The significance of the leucocytes and lymphocytes present in diseased body cavities is well known to us. The former are associated with acute inflammations, and the latter with the more chronic lesions. In inflammation of the meninges, they bear the same significance, and we find in the early acute stages enormous numbers of leucocytes. Later on, as the inflammation subsides, we find both an absolute and a relative diminution in the number of these cells, and a corresponding increase in the number of lymphocytes—a most satisfactory sign.

6. TREATMENT.

The best method of treatment, at present available, is the immediate and repeated injection into the spinal theca of a reliable antimeningococcal serum, following the withdrawal of a considerable amount of the excessive fluid through the cannula. The serum usually exerts a rapid action on the meningococci, and a diminution in their number, together with a lessening of the amount of albuminous substance, and an alteration in the type of cell present will probably be found to have taken place within a few days.

The antimeningococcal serum, as first given intrathecally by Flexner, has both antitoxic and antibacterial properties, and is usually standardized by an estimation of its phagocytic properties. We do not know exactly how it exerts its beneficial

effects, but presumably not by encouraging phagocytosis, since we find before we give the serum that almost all the cocci are already intracellular. The favourable action of the serum is not constant, and we do not know whether the fault lies in the preparation of the serum or is due to some variation in the infective agent. In some refractory cases, for instance, an organism slightly different from the meningococcus, and known as the para-meningococcus has been isolated, and the administration of an autogenous serum has resulted in a cure.

The treatment of acute cases, when meningitis is present, by meningococcal vaccines alone, is a course that seems certainly doomed to failure; firstly, because there appears to be but little necessity for the production of anti-bodies of the opsonic type, as well as because anti-bodies, produced in the tissues and circulating in the blood, have but very little chance of ever getting into the meningeal sac. To me it seems that the best results would be obtained by combining the principles of serum and vaccine therapy. An autogenous vaccine might be administered, and the patient's serum, containing his own anti-bodies, could subsequently be transferred to the spinal theca, as in the method devised by Swift and Ellis for the treatment of syphilitic lesions of the spinal cord with Salvarsan. This method would have very obvious limitations in acute cases.

The value of the vaccine treatment of carriers is now being investigated, and no definite conclusion has been reached. I do not think we can hope for much success from this method, because, as we know, organisms lying on the surface of the pharyngeal mucosa are, strictly speaking, outside the body, and no amount of anti-bodies circulating in the blood and tissues could be expected to touch them.

The prevention of meningococcal infection by prophylactic inoculation is now under investigation as well, and perhaps the same argument will apply here, so far as the local pharyngeal infection is concerned. It may be, however, that generalization of the disease can be prevented, and that is perhaps the chief point.

Progress in the treatment of the disease necessarily depends on our progress in the understanding of its origin and working, and it has been the object of this lecture to show in a broad and general way the position we have reached in that respect.

A NEW OPERATION FOR THE RELIEF OF PRURITUS ANI.

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PRURITUS ANI is commonly regarded as falling into three classes, namely :—

1. In which it is associated with general disturbances of metabolism, such as gout, diabetes, etc. ;
2. In which it is associated with other local rectal conditions, such as hæmorrhoids, fistula, fissure, etc. ;
3. In which no other cause, local or general, can be found.

Personally, I doubt whether the first class is a real one. I do not mean to deny that a gouty subject may have pruritus ani ; but I have found that when the physician has expended his wiles upon him, and the gout or other metabolic disturbance is at length pronounced as being under control, the pruritus remains. I therefore regard the association as accidental ; the pruritus exists with the gouty tendency, not because of the gouty tendency. If I am correct, the first class falls automatically into the third.

The second class, in which the pruritus is associated with other local rectal conditions such as hæmorrhoids, fistula, fissure, etc., is a very genuine one, and may cause trouble to the practitioner, who treats the pruritus with ointments without examining the rectum for the presence of a local lesion. If such be present, palliative treatment is certain to be a failure, to the disappointment of the patient and the discredit of the practitioner. Hæmorrhoids, fistula, or fissure may cause pruritus, and in this case nothing will cure the pruritus, as long as the primary lesion is allowed to persist. The late Sir Frederick Wallis was of opinion that the com-

monest cause of pruritus ani was a small ulcer on the mucous membrane at the ano-rectal junction, or at the base of an enlarged papilla. I *have* seen such a condition associated with pruritus, but I am not satisfied, as he was, that it is a *common* local cause.

Be that as it may, the treatment of this second class of case is easily summed up. The primary focus in the anal canal, whatever it may be, must first be cured, and when this is successfully effected, the pruritus will generally disappear.

The difficult cases to deal with are those of the third class, in which the pruritus is the only symptom and rectal examination reveals no local cause of any sort. In these cases, the anal orifice presents a typical picture to the experienced eye. The normal folds of the pigmented perianal skin are thickened, as if by a very chronic œdema, and paler than in the normal individual, a light dove colour, whilst the rugæ between the folds are deepened. If the pruritus has been recently acute, the skin may be excoriated where the patient has scratched himself during sleep; but in quieter periods, the skin outside the pigmented area is absolutely normal.

It is my belief that the condition, like pruritus in some other parts of the body, is due to a local inco-ordination of vaso-motor control, probably in the direction of chronic vaso-dilatation. This would account at any rate for the hypertrophied condition of the perianal tissues.

The operation which I am about to describe is a modification of Sir Charles Ball's operation, which consists of making two crescentic incisions round the anus enclosing the entire ellipse, with the exception of a narrow neck in front and behind. The flaps of skin so marked out are raised, and carefully dissected up as far as the muco-cutaneous junction. The flaps are replaced and retained by sutures. The whole idea of the operation is to cut the superficial sensory nerves supplying the part, and so to render the area anæsthetic.

My experience of this operation is that it cures in about 60 per cent. of cases. Now, it can be demonstrated beyond contradiction that the superficial nerves are cut. If, therefore, the hypothesis that the pruritus is due to an abnormal condition of these superficial nerves is correct, the percentage of

cures should be higher.

I therefore began to make a systematic examination of the cases after this operation by testing the sensibility of the area inside the incisions (1) to a light touch with cotton wool (epicritic), and (2) to a pinprick (protopathic). The results were so anomalous, that I began to doubt the correctness of the superficial nerve theory.

Of the first 20 cases I thus examined, 12 were cured. None of the dozen, tested two months after the operation, had any perceptible diminution of perianal sensation, protopathic or epicritic. Of the remaining eight, who were unrelieved, two after the same interval of time had complete perianal æsthesia. I noticed one other curious thing. In spite of the greatest care taken in tying vessels during the performance of Sir Charles Ball's operation, a hæmatoma, of greater or lesser degree, does fairly often supervene. In all the 12 cases of cure, some degree of hæmatoma had been observed, but in only two of the eight unsuccessful cases.

I came to two conclusions:—

- (1) That the pruritus was not connected with the condition of the sensory nerves of the part; and
- (2) That the operation, when it succeeded, did so by interfering with the vascular, and not the nervous, mechanism of the anal region.

Now the anal region is supplied with blood by the inferior hæmorrhoidal artery, and the tone of this artery, *i.e.* its condition of constriction or dilatation, is controlled by the small branches from the sympathetic system which travel with it. It occurred to me, that if I wilfully cut and ligatured the artery, I should, at the same time, divide the nerve which controlled it, and thus relieve the vaso-motor inco-ordination of the part.

I, therefore, make the same incision on each side of the anus, as in Sir Charles Ball's operation, but instead of dissecting up a flap I cut frankly down into the tissues of the ischio-rectal fossa, until I meet and divide the inferior hæmorrhoidal artery. The artery is small and cannot be dissected out, but it is easy to cut across it, and its spouting ends are then readily recognized and ligatured. One point in technique I regard as

important; I unite the cut edges with Michel's clips. These do not pierce the skin, as sutures do, and make no track for a possible subcutaneous infection. I remove the clips on the fourth day, by which time the wound is healed. I do not give a purge until the clips have been removed, in order to minimize the risk of infection of the wound.

I have been doing this operation for more than a year, but I have not been able to collect a sufficient number of cases to form reliable statistics. In my first dozen cases, I did not have a failure, so that I am led to believe that my theory is correct.



PRACTICAL HINTS ON THE REMOVAL OF TONSILS AND ADENOIDS.

By DOUGLAS GUTHRIE, M.D., F.R.C.S.

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THE removal of enlarged tonsils and adenoids has long been recognized as one of the most successful of surgical procedures. Yet one frequently encounters patients who continue to suffer from tonsillitis or from the well-known adenoid symptom complex, although they have been subjected to this operation on one or more occasions. Since there is no such thing as recurrence of those lymphoid enlargements after a single thorough removal, it follows that one can only attribute such cases to a faulty technique on the part of the operator. Let us, therefore, enumerate the various operations which have been devised, and discuss their respective merits.

Dealing firstly with the tonsils alone, there are four methods of removal in common use:—

1. The vulsellum and bistoury operation. This is clumsy and ineffective, and is applicable only in cases of projecting or pedunculated tonsils.
2. The use of some pattern of knife-and-fork guillotine, such as Matthieu's, an ingenious instrument, but one which always leaves a portion of the tonsil *in situ*.

The above two methods should now be regarded as obsolete.

3. The old guillotine operation; *i.e.* the use of Mackenzie's guillotine or some modification of it, as originally employed; sometimes with the assistance of a vulsellum to drag the tonsil through the ring.
4. The new guillotine operation. This is the only certain means of removing the tonsil entire within its capsule, and is sometimes called "guillotine enucleation"; but as one often succeeded in "enucleating" whilst

using the original method, the terms "new" and "old" appear more appropriate.

The new guillotine operation, introduced several years ago by Whillis and Pybus, is heartily approved by specialists, but it has received little attention at the hands of practitioners who, not having had the advantage of a practical demonstration, base their judgement on some complicated written description, and regard the innovation as a difficult and uncertain manœuvre. In reality, this new mode of using the guillotine is quite as simple as the old original method, and is infinitely more satisfactory.

For the sake of comparison, the two operations may be briefly described.

THE OLD GUILLOTINE OPERATION.

The guillotine is firmly grasped in the right hand. The ring is then threaded over the tonsil, the lower surface of the shaft facing the side with which one proposes to deal.

Firm leverage is next exerted, so that the ring is pressed outwards in a lateral direction. Counter-pressure by the forefinger of the left hand, just behind the angle of the jaw, assists in coaxing the tonsil into the ring ; or the same thing may be accomplished by traction with a vulsellum, which is passed through the ring and withdrawn with the tonsil in its grasp.

The operation is then completed by driving home the blade of the guillotine with the right thumb.

THE NEW GUILLOTINE OPERATION.

The principle in this case is somewhat different. The guillotine, held in the usual fashion, is introduced like a tongue depressor. The ring is then applied so that the upper surface of the shaft (*i.e.*, the surface opposite the handle) lies towards the tonsil.

The point of the instrument is then dug well in behind the tonsil, which is at the same time levered forwards by bringing the handle over towards the opposite angle of the mouth.

If one has been successful in thus digging the tonsil out of its bed, a swelling will now be seen on the palate just above and external to the anterior pillar, the appearance, in fact,

closely resembling that of a peritonsillar abscess. The swelling corresponds to the upper pole of the tonsil covered by the tissues of the palate, and by pressing firmly upon it with the left thumb or forefinger one can force the entire tonsil through the ring of the guillotine and hold it there whilst the blade is pushed home with the right thumb.

Before withdrawing the instrument, it is turned so that the handle points upwards, and the tonsil is thus removed lying on the lower surface of the blade.

The main points may be summarized as follows :—

1. Holding the guillotine with its upper surface towards the tonsil, thread the ring over the tonsil, and press the point of the instrument well in behind the tonsil.
2. Lever the tonsil forward so as to produce a swelling on the palate.
3. Press upon this swelling with the finger or thumb, thus forcing the tonsil through the ring of the guillotine.
4. Having driven home the blade, withdraw the instrument with its lower surface, carrying the tonsil, uppermost.

The second (left) tonsil is removed in precisely the same manner, the only alteration being in the position of the operator. When removing the right tonsil, he stands on the right-hand side of the patient, while for the left, he stands at the head of the table.

The following additional axioms may prove useful to beginners :—

Firstly.—Be sure that the lower pole of the tonsil is already through the ring before pressing the upper pole through.

Secondly.—Remove the first (right) tonsil rapidly, before blood has had time to collect and obscure the view of the second one.

Thirdly.—Take care that the uvula is not included in the grasp of the guillotine. It is unintentionally removed more often than might be supposed.

Lastly.—Never attempt this operation in adults. Enuclea-

tion by dissection with scissors and snare is then the operation of choice.

If the above details are closely followed the operation should present no special difficulty. I have practised it in over 200 cases, and regard it as greatly superior to any of the older methods. A tonsil, which requires removal at all, surely requires complete removal, and only by the new guillotine operation can this be accomplished with any degree of certainty.

REMOVAL OF ADENOIDS.

Having dealt with the tonsils, one next proceeds to remove the coexisting adenoids, and here it may be mentioned that there is no need to subject a child, suffering from enlarged tonsils, to the discomfort of a digital examination of the nasopharynx prior to operation, for if the tonsils are enlarged the presence of adenoids may confidently be assumed.

I have referred to the frequency with which adenoids are incompletely removed. This failure is in my opinion the fault of the instruments rather than of the operator. One cannot hope to clear from the nasopharynx an oblong mass of tissue by using a blunt curette with a pear-shaped fenestra.

The adenoid curette should have a square or oblong fenestra, should be fitted with a suitable hooked guard, and should be very sharp. One of the best patterns is StClair Thomson's.

The instrument should be grasped like a dagger, introduced behind the palate, carried upwards until felt to impinge upon the posterior border of the vomer, and then swept firmly downwards over the posterior wall of the nasopharynx.

The operation is then completed by planing off any remaining tags or ridges with an unguarded curette.

POSITION OF THE PATIENT.

In this matter there is considerable difference of opinion. Personally, I have abandoned the plan of allowing the head to dangle over the end of the table. The patient should lie on his back, with a small pillow or sandbag under the nape of the neck, the head being thus slightly extended, and this position should be maintained throughout the operation.

INSTRUMENTS REQUIRED.

A good self-retaining mouth gag, such as Doyen's.

Tonsil guillotines. Numerous patterns are on the market, and the selection is largely a matter of individual taste. I prefer Whillis's instrument, but have used Ballenger's and Heath's with equally satisfactory results. The essential features are that the shaft should be strong and inflexible, the ring of medium size ($\frac{3}{4}$ -inch), and the handle set at an obtuse or a right angle to the shaft.

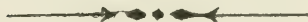
Adenoid curettes. These have already been described.

CHOICE OF AN ANÆSTHETIC.

Unless the operator be fairly dexterous, C.E. mixture had better be employed; though, after some experience has been acquired, it will be found that ethyl chloride gives a sufficiently long anæsthesia. The actual operation may usually be completed within 40 seconds, and the patient need not be on the table for longer than three or four minutes in the average case.

AFTER-TREATMENT.

The child should rest in bed for a day. Sucking of ice will relieve local discomfort, and a peroxide spray will usually check any bleeding. Little or no food should be given, and parents or nurses must be warned that the child may vomit blood, as a good deal is frequently swallowed during the operation. The administration of an aperient next morning is generally advisable. The patient may gradually return to ordinary diet, and may be allowed out of doors within a few days.



THE VALUE OF BLOOD EXAMINATIONS IN ACUTE DISEASE.

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THE value of blood examination cannot be over-estimated in clinching the diagnosis, when one is confronted with an acute condition of a baffling character. The following cases have occurred, among others, in the course of general practice mostly during the last 18 months. Once mastered, the technique and the gross deductions are very simple and take up but little time, which perhaps is saved, and well repaid by prompt measures undertaken for the relief of the suffering patient.

CASE 1.—R. G., æt. 45. Drove 6 miles in an open trap on a cold windy day; had some cold prepared lunch and public-house whisky, but in the morning complained of pain in epigastrium. He often had attacks of indigestion after unsuitable food. T. 98°, P. 72. No physical signs on examination of chest and abdomen. Mild stomachic and aperient given, and only fluid foods taken. Evening the same condition, T. 98°, P. 72. Bowels moved. Next morning, pain moved to right side of chest over liver. Still pain in epigastrium. No physical signs in abdomen on palpation or deep pressure, except over liver, where there was slight pain. Urine contained indican and di-acetic acid. Patient said he felt all right. He looked ill, and I decided to take a blood specimen (T. 98°, P. 76). This gave 15,625 leucocytes per c.m.m., 90 per cent. polymorphonuclear. On the strength of this, appendicitis of a severe type was diagnosed, and operation advised at once. Three hours later, there was slight resistance over right iliac region, when he was just about to be operated upon. Appendix 8 inches long, retro-cæcal, reaching to under surface of liver. Tip gangrenous with 3 i. pus. Uneventful recovery. This was before Mr. Sampson Handley described the rigidity of lumbar muscles in retro-cæcal appendicitis.

CASE 2.—Mrs. J., æt. 24, recently married, pregnancy 3 months. Had a bath in sea on a cold day. Perfectly well. At night had rigor lasting 20 minutes. T. 105°, R. 40, P. 120, pain in right base of thorax. Very anxious expression. Imperative that she should leave for London next day. Very slight deficiency of air entry at right base, otherwise no physical signs except slight cough. Husband, who was a master of a large infirmary, looked upon it as pneumonia. Blood examination made. Showed leucocytes 10,240 per c.m.m., 11 per cent. mononuclear. Gave permission to

move patient as soon as he desired, as there was no grave disease present from evidence of the blood examination. T. during the day fell to 100° and P. to 104. Next morning, 38 hours after rigor, T. was 98° and P. 80, and patient quite well.

CASE 3.—Mrs. P. F., æt. 28, married, weight 16 stone, one girl of ten. Pregnancy, eight weeks. Has had many abdominal operations on kidney (right) and left ovary removed.

Seized with pain in right iliac fossa, and vomiting with collapse. P. 120, T. 99°. Pain and rigidity of right iliac region. Colour returned soon after vomiting 1–2 hours. Six attacks in 48 hours. Pain persistent in right iliac region. Great thirst. Consultant diagnosed appendicitis. Blood examination made. Blood showed increased clotting. Erythrocytes 3,000,000 per c.m.m.; leucocytes, 15,000; multinuclear, 92 per cent. The blood thus disproved appendicitis, and favoured ruptured ectopic gestation. Operation subsequently proved this. Right tubal pregnancy (nine weeks) abdomen filled with clot. Recovery short and good.

CASE 4.—E. M., æt. 6½ years, girl. Pale, poorly nourished child of well-to-do people, bowel trouble, poor appetite, and always ailing, had seen seven doctors, including four London specialists. Physical signs none, except a merest trace of dulness on the right side near spine at level of third or fourth dorsal vertebræ. Blood examination showed:—Erythrocytes, 6,560,000 per c.m.m.; hæmoglobin, 80 per cent.; colour index, 0·61; leucocytes, 8,125 c.m.m.; multinuclear, 46 per cent.; mononuclear, 46 per cent.; large, 20 per cent.; small, 26 per cent.; eosinophiles, 4 per cent.; mast cells, 4 per cent.

This, with the physical signs suggested the diagnosis of tuberculous glands at the root of lung, and a subsequent skiagram gave definite shadows at level of 3 to 4 D.V. (right-oblique-anterior-posterior view). Child placed on treatment, and reacted splendidly.

CASE 5.—I. G., æt. 24, was suddenly seized with violent abdominal pain about 9 p.m. during an altercation; she said it became jumping almost like a quickening pain. The pains grew worse and she took to bed. She complained that on movement the whole of the abdominal contents seemed to move upon the side on which she was turning.

History.—Had had a normal menstruation a fortnight previously. Her last child was aged 3½ years. At 1 a.m. I was called to see her. She appeared very blanched, although it was the first time I had ever seen her. Her pulse was 90 and of good volume. Upon making P.V., there was nothing to be detected and no pain. The chief pain was at the tip of the right shoulder; it was of a very severe character, and, she said, was agonizing, her whole attention being directed to it. I was told by the husband that she had had “similar hysterical” symptoms before. 9.30 a.m., pulse was 120, thready, of low tension; she was blanched, and still complained of intense pain in the right shoulder, but there was not much abdominal pain, except that the whole of the contents rolled as before. P.V. made again, negative result; a dull continuous pain was referred to the umbilicus, and at times there were sharp shooting pains extending to the liver region, making her faint and rendering her legs

helpless. She had vomited twice during the night, and as it seemed an acute abdominal case, I made a blood examination. On puncturing the lobe of the ear, there was very little flow of blood which tended to clot almost immediately. The examination was as follows:—

Hæmoglobin, 60 per cent.; erythrocytes, 2,500,000 per c.m.m.; leucocytes, 16,250 per c.m.m.; polymorphonuclear, 88 per cent.; mononuclear, 12 per cent.; large, 5 per cent.; small, 7 per cent. Eosinophiles, none.

This clearly proved that there was hæmorrhage in the abdomen, and disproved the diagnosis of acute appendicitis. It narrowed the diagnosis to an acute abdominal condition of this nature—hæmorrhagic pancreatitis, ruptured tube, perforating gastric ulcer, or ruptured blood vessel. As the pains were referred to the upper part of the abdomen, the surgeon, who was called in, was inclined to believe that the pain was due to perforated gastric ulcer, although the blood only showed hæmorrhage and absorption of clot. She was operated on early that day, the upper part of the abdomen being opened first. The abdomen was found full of clot, about $1\frac{1}{2}$ litres. Stomach, intestines, and omentum appeared quite normal. The lower part of the abdomen was opened, and tubes explored. Right tube showed a very small opening which was still bleeding, and proximate to it a slight swelling. This was squeezed up to the small opening, and a very small mass of clot extruded, which upon examination proved to be foetal membranes. The embryo was not found. Tube was extirpated, and patient made rapid and uneventful recovery.

CASE 6.—A. N., aet. 38, female. Was called in one evening to see her, after she had been treated for otorrhœa and persistent and agonizing headache for three or four weeks. The symptoms were becoming greatly aggravated, and the patient was going down hill rapidly.

History.—Otorrhœa, about two months, treated by syringing, etc. Discharge diminished a little for the last two weeks, but the violent headache was continuous and became worse. On examination, I found P. 110; thin discharge from ear, with pain, swelling, and tenderness over mastoid. Patient emaciated, pale, and of yellowish hue, eyes injected, and her only complaint was the violent and excruciating headache. Blood examination showed;—

Hæmoglobin, 90 per cent.; red blood corpuscles, 5,600,000 per c.m.m.; colour index, 0.8; microcytes, 4 per cent. in proportion to reds; leucocytes, 16,250 per c.m.m.; polymorphonuclear, 79 per cent.; mononuclear, 20 per cent.; small, 13 per cent.; large, 7 per cent.; eosinophiles, 1 per cent.

This made the diagnosis of acute mastoid abscess with pent-up pus certain. She was operated upon early next day, when mastoid cells were found full of pus. She made an excellent recovery, and headaches ceased from time of operation.

CASE 7.—B. D., aet. 11. Seized with violent abdominal pain at 4 a.m. P. 104, T. 102°. At 9 a.m. P. 110, T. 103°. Vomiting, pain and rigidity of R. iliac region. Blood examination was as follows:—

Leucocytes, 22,400 per c.m.m.; polymorphonuclear, 88 per cent.; mononuclear, 12 per cent.; small, 7 per cent.; large, 5 per cent.; eosinophiles, nil.

This left no doubt that the case was one of acute appendicitis. The

great point was, whether he would recover without operation, for the parents were dead against this course. Ice was applied, and only fluids given by the mouth. At 1 p.m.: P. 120, T. 103°. Blood examination:—Leucocytes, 23,650; mononuclear, 16 per cent.; multinuclear, 83·5 per cent.; eosinophiles, 0·5 per cent.

At 3 p.m.: P. 118, T. 104°. Blood:—Leucocytes, 20,100; multinuclear, 80 per cent.; mononuclear, 19 per cent.; eosinophiles, 1 per cent.

At 6 p.m.: P. 108, T. 102°. Blood:—Leucocytes, 18,320 per c.m.m.; polymorphonuclear, 8 per cent.; mononuclear, 18 per cent.; eosinophiles, 1 per cent. The evidence of these blood examinations showed clearly that the suppurative nature of the disease was rapidly being overcome by the body reactions, and it was decided not to operate.

Second day: P. 100, T. 101°. Blood:—Leucocytes, 17,400 per c.m.m. From this time he made an uninterrupted recovery, and has had no further trouble for four years, and this upon an ordinary full and fatty diet. He is a cretin of the Lorraine type.

CASE 8.—C. G., æt. 12, was sent to me to find out cause of ciliary spasm of left eye by an oculist, who surmised that it was due to some general cause of which there seemed to be no outward evidence.

History.—A sharp and very active lad. Had “glandular” fever two years previously and fully recovered, for no glands were palpable afterwards. Tonsils and adenoids had been removed some years back. Present condition:—Glands palpable on both sides of neck, one hard one on left side behind sterno-cleido-mastoid. Some hard and palpable ones in axillæ and groins. The blood picture was as follows:—

Hæmoglobin, 85 per cent.; erythrocytes, 6,000,000 per c.m.m.; erythrocytes by volume, 87; microcytes 19 per cent. in proportion to reds; colour index, 0·70; leucocytes, 15,600 per c.m.m.; polymorphonuclear 17 per cent.; mononuclear, 82 per cent.—small 77·6 per cent., large 3·4 per cent.; eosinophiles, 1 per cent.; mast cells, none; others, none.

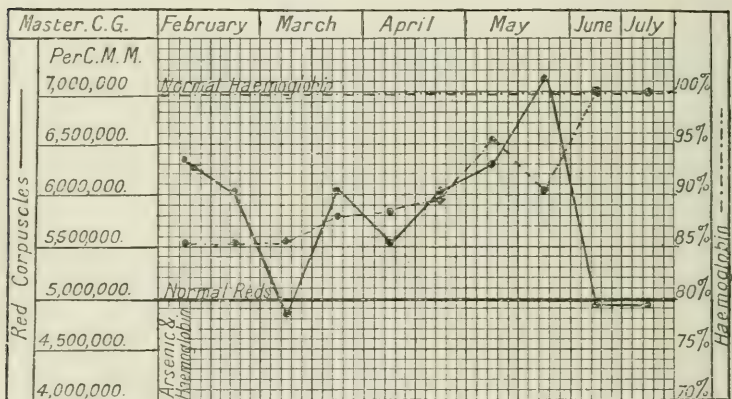
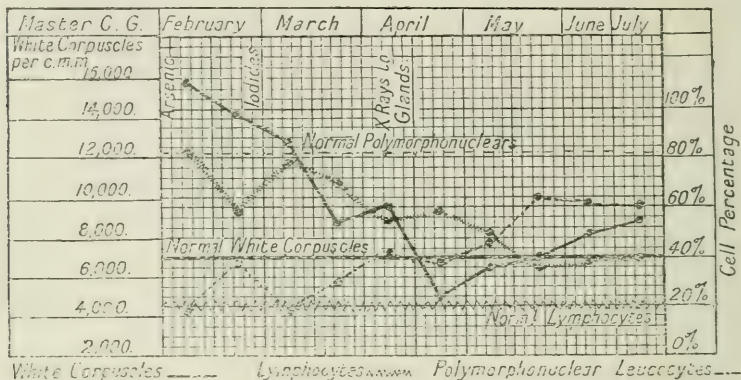
This raised doubts whether the case was one of early Hodgkin's disease, lymphatic leukæmia, or merely bovine tuberculosis. Anti-tuberculous treatment was instituted, and blood picture gradually became more and more normal till the lad went out of my care. At the same time glands became smaller till only a few soft ones were, with difficulty, to be detected under left sterno-cleido-mastoid; they had entirely disappeared from other regions.

The accompanying chart illustrates the value of noting the progress of disease by frequent blood examinations. The final one taken was:—

Hæmoglobin, 100 per cent.; red corpuscles, 4,960,000 per c.m.m.; colour index, 1·02; red corpuscles by volume, 98; microcytes in proportion to reds, 3 per cent.; leucocytes, 8,800 per c.m.m.; polymorphonuclear, 61 per cent.; mononuclear, 37 per cent.—small, 33 per cent., large, 4 per cent.; eosinophiles, 2 per cent.; others, none.

CASE 9.—S. C., male, æt. 21. Tall youth, with neglected adenoids. Had enjoyed good health till three months before present attack, when he had a “bilious” attack with vomiting after eating some veal. This passed off within 24 hours. Present attack: after eating pork he had a similar

"bilious" turn, vomiting with no pain. Aperient given. Carminatives and fluids by mouth. T. 99°, P. 100. Abdomen supple, and no pain on



deep pressure anywhere. Vomiting ceased, but patient felt a bit weak. T. and P. rising for two days to T. 105°, P. 144. No signs in chest or abdomen. Bowels regular. No rigidity of lumbar, or spinal muscles. Then, the third day from vomiting, blood was as follows:—

Hæmoglobin, 90 per cent.; reds, 5,400,000 per c.m.m.; leucocytes, 15,000 per c.m.m.; multinuclear, 84 per cent.; mononuclear 15 per cent.; eosinophiles, 1 per cent.

This clearly shows the gravity of the case, and having had similar blood results as this with obscure clinical signs I had no hesitation in pronouncing the case to be one of appendicitis associated with pus. Upon this I made a rectal examination, there was a distinct spot which caused pain well above the prostate in mid-line. Here again the surgeon was somewhat in favour of the view that the cause was one of perforating gastric ulcer.

Operation.—Appendix, eight inches. Tip, gangrenous, one ounce of foul pus, appendix extended into Douglas's pouch. One week later leucocytes were 12,000 per c.m.m. Organism cultivated from pus was

found to be Fränkel's pneumococcus. Two weeks later leucocytes were 14,600 per c.m.m. Large abscess opened. Wound would not close, and autogenous vaccine was given. Blood:—Leucocytes, 12,620 per c.m.m. Multinuclears, 82 per cent. Very slow progress made, and at the end of ten weeks he still had a sinus nine inches deep reaching to back of bladder. Two ionic séances with zinc and zinc sulphate, with six days' interval completely healed this. Blood did not improve much beyond 11,300 leucocytes per c.m.m. Operation for adenoids then undertaken. Curette came away filled with substance like soft white cheese. The parts were thoroughly treated, soon healed, and became normal in appearance. From this time onwards he made rapid progress, and a blood examination later showed leucocytes 7,500 per c.m.m. with polymorphonuclear 78 per cent. and mononuclears 21 per cent. He has since been accepted for service in the Guards.

CASE 10.—A. J., female, æt. 42. Called in to see this case by surgeon, just before operation was about to be undertaken for right peri-nephric abscess. Symptoms, pain over right lower dorsal region, and on deep pressure below liver—no rigidity. T. 99°, P. 102. Blood count as follows:—Reds, 5,400,000 per c.m.m.; hæmoglobin, 85 per cent.; leucocytes, 7,610 per c.m.m.; mononuclear, 16 per cent.; multinuclears, 83 per cent.; eosinophiles, 1 per cent. I had no hesitation in advising the surgeon to alter his mind about making a posterior incision, and to open the abdomen from the front, for I was strongly inclined to look upon the case, taking the clinical signs together with the blood examination, as one of gall stones; if this should not prove to be the case, he could then examine the kidney, etc., through same opening.

The incision was made just below right ribs in front, and gall bladder was found to be full of large stones about 20 in number.

This exemplifies in a typical manner the value that such a simple examination can prove to be when symptoms point in another direction. The patient escaped a second operation and the reputation of the surgeon was saved.

CASE 11.—A. T., male, æt. 32. Had many previous attacks of gastritis associated with a fixed point of pain in epigastrium with vomiting—never passed nor vomited blood.

Seized at 5.30 a.m. with sudden and violent pain, referred to umbilicus, after having had a liberal dinner of roast pork the previous evening. Violent nausea. Patient collapsed and pale. P. 110, small, T. 99°. The whole of the upper left quadrant of abdomen was rigid and tender as was also the left rectus rigid for two inches below umbilicus. 8.30 a.m. nausea and retching still violent. P. 108, T. 100°. Abdomen just as rigid as before and as tender. Has vomited a little yellow fluid tinged with blood. Blood examination made:—

Hæmoglobin, 95 per cent.; erythrocytes, 5,800,000 per c.m.m.; leucocytes, 6,716 per c.m.m.; polymorphonuclear, 82 per cent.; mononuclear 17 per cent.; eosinophiles 1 per cent.

On the strength of this, I immediately gave the man a full hypodermic of morphia, as it showed that there was no grave disease present, although

the sudden and violent symptoms pointed to perforated gastric ulcer. A purge was given as well, and by the next day he was practically fit.

One could add many more cases illustrating the very great help it affords one in clearing up obscure diseases of practically every description, if taken with due regard to the clinical signs. For instance, some time ago a child was seen for the first time in an unconscious condition. Physical examination negative, T. 103° , P. 118. Abdomen supple, no spots. Blood count showed leucocytes 2,720 per c.m.m. Immediately upon this typhoid was diagnosed, and child sent to isolation hospital without waiting for a Widal's reaction, which subsequently proved positive.

With regard to obscure cases of cancer, blood examination is of the utmost importance, and, personally, I have been the means of clinching the diagnosis in quite a score of cases of carcinoma of the œsophagus, stomach, and mediastinum. I admit that, although those cases usually give a low count, and there is an increase in the mononuclear leucocytes, it is to a certain extent a personal equation. The shape and staining qualities of cells, etc., the blood picture, in short, viewed as a whole, adds the extra evidence, and so seals the diagnosis.

I always look upon a patient with acute appendicitis, whether he is desperately ill, or walks into the consulting room, who has a blood count of over 30,000 leucocytes per c.m.m. as a hopeless case, no matter what is done. I have seen four cases in which there were found from 30,000 to 34,000 leucocytes per c.m.m. Three were operated upon, one walked to the hospital unaided, and one was not operated upon, but they all died within 60 hours.

One other example of a fairly frequent case is easily disposed of by a simple count.

CASE 12.—A. P., aet. 26, female, with T. 103° – 104° , P. 110–120, R. 30 complains of pain in appendix region with rigidity of right side of abdomen, knees drawn up. Case sent in as acute appendicitis for immediate operation. Blood showed leucocytes 45,000 per c.m.m. Eyes bright, no physical signs in chest, but on the blood alone one might almost diagnose acute lobar pneumonia. This I urged; nevertheless, she was operated upon and a normal appendix removed, gall bladder explored, distended but healthy. Respirations ceased quite 15 times during operation, and patient in desperate condition when returned to bed. Double

lobar pneumonia was evident next day, and although patient recovered, she had three months of severe illness and phlegmasia alba dolens.

This shows what this patient might have been saved by a simple process occupying but a few minutes, if acted upon.

The study of human and bovine tuberculosis and cancer by means of the blood is an interesting subject, and I should not be surprised if, in the near future, some definite data or blood reactions, are found that will leave the diagnosis of these conditions beyond doubt.



SOME PRACTICAL HINTS ON THE REMOVAL OF
SUPERFLUOUS HAIR BY ELECTROLYSIS.

By LULLUM WOOD BATHURST, M.D.

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THE disfigurement, in the case of women, of hair on the chin and upper lip, and the distress which this disfigurement frequently induces are so great, that its successful removal is often a matter of great importance to the sufferer.

Little is known as to the cause of this condition, but it is most common in unmarried women over 30 years of age, which suggests some relationship between the hairy growth and uterine inactivity. I have frequently been told that the condition has arisen after a period of strain or worry, or some acute illness.

In considering the removal of hair, that method must be favoured which, if possible, combines—

1. The most effectual means against any return of growth.
2. The least amount of injury to the skin.
3. The smallest amount of suffering to the patient.

It may be said at once that epilation and removal by barium hyposulphite, caustics, and other depilatories are measures which stimulate further the development of that which they seek to minimize, and that the only safe and efficient way of dealing with this condition is by electrolysis. It is upon the matters of detail employed in its use, that the degree of satisfaction of those ideals above-mentioned depend.

The apparatus required consists of—

- a. An electrical appliance for producing a continuous current of low amperage, measured through a galvanometer.
- b. Needle-holder and needle with cord attachment.
- c. Indifferent electrode with cord attachment.
- d. Forceps and spirit lamp.

The current necessary being the continuous one, an ordinary

cell battery may be used, though it is not very convenient on account of the difficulty in regulating the strength of current to that required. When such is used, from 2-5 cells are generally necessary.

When the electric current can be drawn from the main, a shunt resistance, or the pantostat, answers the purpose admirably.

The needle-holder, as supplied by the various electrical firms, is generally made with four or six teeth which close and grip the needle by means of a screw.

With regard to the needle, the essential qualifications are that it shall be of a size that can easily be introduced into the hair follicle, of a degree of flexibility which will allow of its following the curve of the follicle when, as is often the case, it is not straight, and yet will not kink too easily when slight resistance is encountered. Steel and irido-platinum needles are often used, but are not flexible enough.

The late Dr. Lewis Jones took a great deal of trouble in experimenting with various forms of needle, and for some time before his death had used platinum wire of $\cdot 15$ millimetre diameter. This, in my experience, is a very convenient needle to work with, though in some cases a $\cdot 2$ m.m. needle may be substituted with success.

A piece of wire, from $\frac{1}{2}$ - $\frac{3}{4}$ -inch in length, is fixed in the holder with $\frac{1}{8}$ - $\frac{1}{2}$ -inch projecting. The point is then carefully ground on a fine Arkansas stone so that the extremity is well *rounded*, not pointed. This permits the needle to enter the follicle more easily, and minimizes the danger of perforation of the follicular sheath.

The indifferent electrode may be a metal staff to be grasped in the hand, or a moistened pad.

The forceps should be ground, so that the blades oppose each other accurately in the terminal quarter of an inch, the opposing surfaces being smooth.

The strength of current employed should be from $\cdot 75$ - $1 \cdot 5$ or 2 milliamperes, 1 m.a. being generally quite sufficient. If the pantostat be used, it may be set by experiment for each individual case, and will remain nearly constant, requiring only slight adjustment as resistance is overcome, throughout

the sitting.

Of the greatest importance is a good light, and if daylight is not good, a head-lamp, which may also be worked from the pantostat, combined with Zeiss's binocular magnifiers gives great assistance. I have derived no help from ordinary lenses held in the hand.

The patient is placed on a couch with the head well back, the operator standing at the head of the couch with the pantostat on his left, if he uses the right hand for the needle holder, so that he may be able to regulate the current if necessary with the left hand. The needle should be sterilized in a spirit flame before each insertion.

The needle is usually connected with the negative pole, and the indifferent electrode to the positive. The result of this is that hydrogen is liberated wherever the needle is in contact with the tissues, together with the alkalies, sodium and potassium, which effect the destruction of the papilla. The success of the operation on each individual hair depends upon the introduction of the needle into the hair follicle, so that the point may reach *and destroy* the papilla. This may be effected with a current of 1 m.a. in 5-20 seconds, and one may fairly assume success when after such treatment the hair is found to come easily out of the follicle, as if it had merely been lying in it with no attachment.

If the hair needs any force for removal, it should be assumed that the papilla had not been destroyed, and the operation should be repeated.

At a sitting, from 20-50 hairs may be removed, but care should be taken not to attack too many in any given area on account of the danger of inflammation being set up. A skilful operator may count on permanent destruction of 60-80 per cent. of the hairs treated.

A difficulty which is sure to be encountered at first, and which may be met with at any time, is that connected with the introduction of the needle. Fair hair of a fine silky quality on a fair skin presents difficulties of vision, which a good light and suitable lenses may do much to overcome.

There are also anatomical difficulties:—

The neck of the hair follicle may be constricted so closely as to offer great obstruction to the entry of the needle.

The direction of the hair follicle beneath the skin may be different to that expected, and the hair as seen is not always a guide to that direction.

The needle may inadvertently be directed into the duct of a sebaceous gland instead of along the hair sheath.

A difficulty frequently met with is the heaping-up of epithelial cells round the follicular opening and in close contact with the hair itself. Practice and experience alone can help to overcome these difficulties.

The immediate result of the electrolysis which is noticeable is the bubbling froth round the needle at the mouth of the follicle caused by the liberation of hydrogen. This is greater in proportion to the moisture round the hair. Hyperæmia of the skin is observed as the result of the electrical stimulation, varying in degree in different individuals. This hyperæmia passes off in the course of an hour or so.

The number of sittings necessary and their frequency vary in different cases. One or two sittings a week may be given at first, and their frequency gradually diminished. The work, necessitating as it does the closest attention and care, should never be undertaken in a hurry or under any but favourable conditions, but only when time and circumstances permit of the strictest attention to detail.

While any obvious scarring is evidence of bad workmanship, it should be recognized, and explained beforehand to the patient, that where a large number of hairs have to be treated on a small area of skin, some alteration of the general texture of the skin is unavoidable.



THE TRAGEDY OF GLYCOSURIA.

By KEITH ROBERTSON, M.D.

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A YOUNG woman, pale, thin, and tired, walked into my consulting-room, and sat heavily down in the chair opposite me. There, her cheeks hollowed, her chin sharp and pointed, her body thin, and her aspect haunted, she confronted me. Occasionally, she passed her tongue between her lips to moisten them, as if she felt them dry and uncomfortable. There was a slight flush on the prominences of both cheeks, and she looked like an animal which had nearly been starved, and which licked its lips in anticipation of a meal. Although her manner was quick and irritable, she commanded my sympathy; for, young as she was, she was in much distress. She was passing great quantities of "water," and was compelled to rise every two hours during the night; it was wearing her out. Then, so irritated and itchy about the vulva was she, that she could not fall asleep; no amount of washing, bathing, or anointing relieved her. And what a thirst! It was insatiable.

She almost named her trouble as she spoke.

I boiled some Fehling solution, and added a drop or two of the urine she had brought with her, and the reduction to brick-red was immediate and unhesitating. I added three drops of liquor ferri perchloridi to a little more urine in another tube, and there was the tell-tale deep red colour of diacetic acid! Bad! very bad, combined with her youth!

We call it diabetes, simply because there is an excessive flow of urine. The mind-picture of that word is that of an archer, standing and taking aim; his left arm is forward, the bow is bent, and the string drawn tight, whilst his left foot is advanced, and his right back. It is this stride which is in our mind: he is overstepping, exceeding; it is *diabainein*, to bestride, to exceed, and the flow of urine in

glycosuria oversteps the bounds of custom and comfort.

There is a diabetes mellitus; and there is a diabetes insipidus. In both, there are a large output of urine, thirst, and emaciation; but in mellitus hunger and glycosuria are present as well. What, then, is diabetes mellitus? It is a disorder of nutrition, in the wide sense. There is sugar in the blood in greater amount than usual; there is sugar in the urine, where there ought to be none at all.

The causes of glycosuria are of various kinds. First of all, there is phloridzin glycosuria. Phloridzin has the power of compelling the secretory epithelium of the kidney to break down serum-albumen to yield sugar. Phloridzin glycosuria, therefore, is not due to an overflow of an excess from the blood. Its action proves that there may be conditions in which there is glycosuria due to an unusual mode of action of the kidneys. In France, they endeavour to separate off a class of diabetics in whom the condition is due to the kidney only. I have seen temporary glycosuria follow acute inflammation of the kidneys due to the *bacillus coli communis*.

Then there is the fact that the presence of sugar in the urine may be due to the ingestion of too much sugar, especially of some kinds of sugar. This, no doubt, may be so; but it is obvious that it is a functional condition, and will be only temporary.

There is, too, the glycosuria which follows puncture of the medulla. There must be a centre there, which has some influence on the sugar-metabolism, and probably has to do with the vaso-motor, or, to be more strictly truthful, sympathetic nerves. The effect produced by its stimulation is either that of "flooding-out" more sugar into the blood, or, what we are more inclined to believe in the light of our present knowledge, of stimulation of the adrenals, the outpouring of more adrenaline, and consequent glycosuria.

But none of these can be causes in this case; there is no sign of disease in the central nervous system. We must go further back in our inquiry, and take up the survey of our knowledge of the cause of glycosuria as it stands to-day.

All we know definitely are two elementary things: one, that if the pancreas of the dog is removed altogether, there

follows immediately a severe diabetes, with all the usual symptoms of hyperglycæmia, glycosuria, polydipsia, polyuria, wasting, acetonæmia, and death by coma; and the other, that, by post-mortem examination, in cases of severe diabetes, 90 per cent. show characteristic changes of the islands of Langerhans in the pancreas, and that in mild cases it runs to from 40 to 50 per cent.; improved methods of examination might bring in the bulk of the other cases within the group of those thus shown to have some lesion of the pancreas. These two facts make us strongly suspect the pancreas.

But we know something further. We know that if only one-tenth of the pancreas be left to the dog, the glycosuria is not complete. We know, too, that, after the pancreas has been removed, no other organ comes forward and educates itself to take its place. Progressive diabetes has never been produced by the excision of any other organs. Some have thought that they have done so by removal of the salivary glands or of the duodenum, but their technique was faulty; others have produced glycosuria after painful operations, but, probably, this is only stimulation of the sympathetic, as in Claude Bernard's experiment.

The pancreas, therefore, is more than under suspicion. Now, if it is to blame, the question is whether it is due to the external secretion, which flows out by the duct, or to the internal secretion.

It is not due to the external secretion; for, if we remove part of the gland, preserve the part with the vessels and duct, transplant it near to the surface, and arrange to let its external secretion escape, we get no diabetes; but, on removal of this part too, we get immediate diabetes. Therefore, it is not the external secretion.

It must, then, be due to an endocrinic secretion: the pancreatic hormone. But this pancreatic hormone has never been isolated. Whatever it is, it is only presumed to be. Search has been made for it in the pancreas itself without success, for, unlike the thyroid secretion, it seems to be made to order, not stored. Chyle from the thoracic duct has been found slightly useful in diabetes, so surely the active principle will be found there. It is not. Whatever is there must be merely the overflow of unneeded hormone, and it is elusive, not to be

separated. We look for it in the portal vein, but it is not there. Yet it is there, and the lack of it causes glycosuria. How and where it acts, opens up a vortex of questions, only to be met by another series of theories and guesses.

The hormone is supposed by some to act by enabling the muscles to take up the sugar from the blood, and "metabolize" it. Another idea is, that it acts by controlling the production of sugar in the sugar-forming organ.

In picturesque language, the "non-oxidation" theorists say, that in diabetes the muscle cells are like people confined to their houses (the muscles), who are starving for want of the special food they require (glucose), and who are always sending urgent messages by wire (the nerves) to the great warehouse and factory (the liver) for more food. The liver, in response, sends out more and more supplies, till the sugar in the blood rises from 0·1 per cent. to 0·3 per cent., and the incarcerated inhabitants starve, while adown the streets (the blood-vessels), and past their doors there go overflowing loads of the very food they are needing.

The other opinion is that it is all due to the eccentricity of the people at the sugar factory. The sugar factory in the liver has taken leave of its senses, and, no longer suiting the supply to the demand, is turning out sugar at such a rate that the market is overstocked, and through the kidney it is necessary to find a "dumping place" in the urine.

In other words, the one side says that the sugar in the blood is not oxidized by the muscle-cells in diabetes, because the pancreatic hormone is not present in sufficient amount to enable them to carry out their action, and that their lack of sugar leads to a further stimulation of the liver with the consequent output of more sugar, resulting in hyper-glycæmia and glycosuria. Further, they say, the muscles, not being able to obtain their energy by the oxidation of sugar, tackle the fats and break them up, forming β -oxybutyric acid, diacetic acid, and acetone; and that, if only the tissues could be supplied with glucose, pathological acetonæmia and acidosis would quickly disappear. For this reason, it is not wise entirely to cut off the carbohydrates for long from the diet of diabetics. If, therefore, one could introduce at regular intervals into the body of this young

woman the required quantities of the pancreatic hormone, the muscles would be able to take up the sugar they so much require, and would cease their urgent calls on the liver, with the result that all her glycosuric and hyper-glycæmic symptoms would disappear; further, the fat would not be broken down in the present disadvantageous way, nor cause the diacetic acid which is present in her urine. There remain for answer the further questions, however, of how it is proved that the hormone assists the muscles and how it is shown that they do not oxidize the sugar as before. Besides, there may be another explanation of the faulty breaking-down of fats. The experiments of M. Lansberg prove that in diabetes the blood-cells and the muscle-cells use up just as much sugar as they did before.

Von Noorden starts with the theory, that the cause of all the trouble is that there is an overproduction of sugar on the part of the liver. He says virtually this: "The sugar factory in the liver is under the dual control of the pancreas and adrenals; the pancreas slows down the machinery, and the adrenals speed it up. Remove or weaken the pancreas and the adrenals have the upper hand, and take it. The sugar production increases out of all proportion; all the carbohydrate is seized and converted into sugar, and not only so but, so great is the madness at the factory, albumens and especially fats are dragged in, disintegrated, and used as raw material for that activity, which at all costs will make sugar out of all things available! Hence you have the products of fat-metabolism, β -oxybutyric acid, diacetic acid, and acetone."

To bear this out, he says: "Tie the veins from the liver, so that no blood with the glucose gets into the system, and what happens? In the non-diabetic dog the respiratory quotient rises at once to 1, for, all the energy is then derived from the sugar in the blood; in the diabetic dog, the respiratory quotient also rises to 1; so that we may say that while, as in the non-diabetic dog, the only source of energy is the carbohydrate of the blood, it is evident that in the diabetic dog this carbohydrate is fully oxidized, for the quotient is 1." By the respiratory quotient is meant the ratio of CO_2 produced to oxygen used. In the case of carbohydrates it is 1.0, and in that of fats it is 0.7. It is, therefore, not true to say that

the cause of glycosuria is the inability of the muscles to take up the glucose from the blood, for they do take it up; nor to say that the action of the pancreatic hormone is to enable the muscles to deal with the sugar, a thing which they are quite able to do even in diabetes.

But, agreeing to differ, one may maintain the theory of the non-oxidation of the sugar, while another may incline to the overproduction hypothesis.

In the meantime, what is our duty to this young woman, who still sits waiting for our advice? It is our duty—

1. To estimate regularly the total daily sugar;
2. To test regularly for diacetic acid;
3. To diet her with care, keeping an eye on the reduction of the sugar, and avoiding, if possible, the appearance of diacetic acid.

1. First, then, to set about the regular analysis of the urine, she must be instructed to purchase a real pint measure, with the ounces marked, and to measure the urine in the following way. At 8 a.m. she should void urine and discard it, and from that time onwards pass all the urine into a vessel and collect it for the 24 hours. When it comes round once more to 8 a.m., she should empty the bladder whether there is a desire or not, and then measure off the total volume of the urine so collected, taking from it a sample on the days on which it is wished to make an analysis. Having, then, a sample of the whole urine, and the total amount, we are able, by such a method as the Pavy-Fehling, to estimate rapidly, not only the percentage of sugar, but also the total number of grains or decigrammes passed in the 24 hours.

2. But, not only must we know how much sugar she is passing daily, the presence of diacetic acid must be detected and noted. Oxybutyric acid, diacetic acid, and acetone are all related. They come from the breaking-down of fats. Usually this leads to H_2O and CO_2 ; but, abnormally, it may lead to, first, oxybutyric acid, then diacetic acid, then acetone. The presence of acetone in the urine is physiological; on ordinary diet, we excrete in the urine about 0.01 to 0.03 gram. daily, or 0.15 to 0.46 grain. We excrete more in the breath. But these amounts are too small to be recognized by clinical methods. Diacetic acid and oxybutyric acid are not normally

present. Now, as fats are broken down into oxybutyric acid, the body has the power to change that further into diacetic acid, and then into acetone. If the usual rate is maintained, all goes well; but if the rate is accelerated considerably, then, first, an unusual amount of acetone appears in the urine, then diacetic acid, then oxybutyric acid, because time is not given to the system to deal with them. The same thing happens in starvation, cyclical vomiting, delayed chloroform poisoning, salicylic poisoning, and the toxæmias of pregnancy.

It is commonly said that coma is due to these things in excess in the blood, but they do not directly produce coma and death, for they are not poisonous except in large doses; it is the reduction of the alkalinity of the blood to zero which brings about death. First, the sodium and potassium alkalies are used up, then the ammonia; even if the soda is resupplied, there comes a time when even sodium oxybutyrate is poisonous. For this reason, a watch must be kept on the amount of diacetic acid present in the urine. The test for diacetic acid and not for acetone or oxybutyric acid is made because it is difficult to test for the last two, while it is quite easy to make a rough test for diacetic acid. All that has to be done is to add a few drops of liquor ferri perchloridi to about three millilitres of urine, and if the acid is present, a deep red colour is produced, which goes on heating. The reddish precipitate of iron phosphate must not be mistaken for it.

3. With regard to treatment, we cannot expect to cure this young woman. The prognosis is not really good; two things are against her, the diacetic acid and her youth. The only things to do for her are to diet her, and combat the acidosis.

There is no such thing as a hard and fast diabetic diet. In each case, the patient's own measure for food must be taken. Our first aim will be to withdraw the carbohydrates, for this will tend to curtail the manufacture of sugar. But replacing the carbohydrates places us on the horns of a dilemma, for it is important to reduce them as far as possible, yet not so much as to lead to any increase in the fat metabolism sufficiently to form excess of diacetic acid. Another object will be to arrange a diet which will ease the weak pancreas, and not to throw any digestive strain on it more than can

be avoided. It should be a golden rule, *never to put a patient at once on a full carbohydrate-free diet*, especially if diacetic acid is present in the urine. This must be kept alkaline with sodium citrate or carbonate. Carbohydrates, which form so large a part of our diet, may, to a certain extent, be replaced by fats. Although butter is handy and palatable, it contains the lower fatty acids which are so dangerous in this trouble. These must be washed out with cold water, or use made of margarine. As much fat as the patient can "stomach" is to be taken, as long as the acidosis is not increased thereby.

To what extent the carbohydrates may be curtailed is determined by two things: the amount of sugar in the urine, and the presence of diacetic acid. They should be reduced to the point at which the sugar disappears from the urine, if that can be done without the appearance of diacetic acid. If the sugar will not go, they must be cut off altogether with the same proviso. If diacetic acid appears, or if drowsiness or vomiting, symptoms of acidosis, set in, some carbohydrate must be given at once. The best way to do this is Von Noorden's oatmeal method, which produces least glycosuria. Nothing is taken for three or four days but 8 ozs. of oatmeal, given as a gruel every two hours, with butter, eggs, vegetable proteins, tea, etc. The vehicle of all this fat is a very important matter from the patient's point of view. The difficulty can be realized if one were told to stop all bread and potato, and to eat a very large amount of butter and fat. The first question would be, "What am I to take in place of bread and potato?" This is the patient's first question, and we must be able to answer it. Gluten, or diabetic breads are not free from starch, are largely non-nutritious, expensive, and unpalatable. Yet we must use them, and know where to obtain them, for our patients will look to us for minute instruction. "Casoid Bread" and "Casoid Meal Bread" can be got from Callard and Co., 74, Regent Street, London; "Proteine Diabetic Bread" from the Protein Co., 36, Welbeck Street, London, W.; "Energen" gluten bread and biscuits, from the Therapeutic Food Co., 26, Bedford Chambers, Covent Garden, London, W.C., and sometimes excellent gluten bread can be got locally.

With regard to proteins, meat, fowl, fish, eggs, vegetable

proteins, especially milk proteins, such as cheese, casein, vi-casein, etc., are all available. Much can be accomplished by the study of a good cookery book like the Apsley.

Now, this all seems plain sailing, but there is much controversy on the subject of food for diabetics, though not a word of it has entered here. Such controversies serve the purpose of keeping us from the unsafe, but comfortable, feeling that we have reached the final word on the matter.

Lastly, comes the question whether anything else can be done by any drug, any specific, or any organic extract. For drugs, any text-book may be consulted, but they are futile. For specifics, the current advertisements may be searched; they contain much to interest us, and much to disappoint. The pancreatic extract has not yet been worked up to practical use, and we have not been able to separate the hormone (pancreatine) as we have adrenalin.

An unsatisfactory ending, is it not ?



THE THYROID GLAND.*

By H. R. UNWIN, M.B., F.R.C.S.

Yeovil.

THE importance of the internal secretions of the ductless glands—particularly that of the thyroid gland—in maintaining a healthy metabolism in the body, has been emphasized so much in recent years,¹ that a discussion on this subject will be of interest.

DEVELOPMENT.

The thyroid gland develops as a bud from the pharynx, growing downwards from the base of the tongue into the neck. From this bud are formed the isthmus and lateral lobes, the stem of the bud remaining as the thyroglossal duct. The hyoid bone is developed across this duct, which thus becomes divided into a lingual and a thyroid section, and ultimately obliterated. The meatus of the lingual portion remains as the foramen cæcum, and the thyroid portion sometimes persists as the pyramidal lobe. Pathologically, the duct shows itself as a vascular tumour growing at the base of the tongue—the lingual thyroid—and as thyroglossal cysts occurring anywhere in the course of the duct, between the base of the tongue and the isthmus of the thyroid gland.

ANATOMY.

The gland consists of two lateral lobes situated upon the lateral surface of the larynx, and united by an isthmus across the trachea below the level of the cricoid. It is closely tied down to the trachea by the surgical capsule—a process of deep cervical fascia—which accounts for deformity of the trachea in some cases of enlargement of the gland, and for the diagnostic sign of swallowing. Fixation of the gland—as in the breast—usually means malignancy, especially when accompanied by aphonia. Accessory lobes may occur within a triangular area, the apex of which is at the root of the aorta, the base being formed by the edge of the lower jaw. These accessory glands may give rise to retrosternal goitres,

* Paper read before the Dorset and West Hants Branch of the B.M.A.

¹ See THE PRACTITIONER Special Numbers on the Internal Secretions, January and February, 1915.

and so acquire a pathological significance.

The gland is remarkably vascular, being supplied with blood by no less than from 3-5 large arteries. It has been calculated that the blood of a dog passes through the thyroid sixteen times a day. The inferior thyroid arteries are of primary surgical importance, because of their intimate relationship with the recurrent laryngeal nerves, which are liable to be included in the ligatures for these vessels. The blood is carried away by a system of large veins. The lymph passages, which are present in large numbers, open into the deep cervical glands. The nerves, which are comparatively few, are derived partly from the ganglia of the cervical sympathetic nerve and partly from the superior laryngeal nerve.

PHYSIOLOGY.

Complete removal of the thyroid gland causes cretinism or myxœdema, according to the age. This fact proves that the gland in some way very powerfully affects the metabolism and growth of the body. Yet an examination of the blood leaving the gland has not shown the presence of any internal secretion derived from the gland. This has led some observers to maintain that the gland probably acts by neutralizing toxins derived from metabolism, and carried to the gland by the circulation. The truth probably lies somewhere between the two theories. The active principle of the internal secretion is iodine, which is present in considerable quantities.

The physiological effects of Thyroid extract are:—

- a.* A reduction in blood pressure.
- b.* Tachycardia.
- c.* Increased metabolism.
- d.* A physiological diuretic.

There is a close relation between the action of the thyroid gland and other glands in the body. This is most marked in connection with the *sexual glands* in the female, as evidenced by the swelling of the thyroid during menstruation and pregnancy, the common occurrence of goitres at the climacteric and menopause, and the frequency with which amenorrhœa is benefited by the administration of thyroid extract.

There is, too, a relation with the *pituitary gland*, which enlarges after the removal of the thyroid gland, as well as with the *thymus*, which atrophies as the thyroid begins to function at

puberty. This relation with the thymus is emphasized by the marked improvement which follows administration of thymus extract in some cases of goitre, especially those occurring round about the time of the menopause. The thyroid acts antagonistically to the pancreas, for glycosuria commonly occurs in exophthalmic goitre.

Thyroid Deficiency.—In the young, cretinism results with slow growth, delayed ossification of epiphyses, small development of face in relation to the rest of the skull, protuberant abdomen, and sexual infantilism. Supraclavicular pads of fat and the thick protruding tongue are diagnostic as well. There is marked depression in the general metabolism, nitrogenous and fat metabolism being reduced, whilst there is an increased tolerance for carbohydrates. With the reduced metabolism is a diminished heat production, and patients with thyroid deficiency suffer from cold extremities. Extensive atheroma is found *post mortem* in cretins, which is accounted for by the fact that the thyroid secretion governs calcium metabolism. In hypothyroidism, there is a retention of calcium salts and *vice versâ*.

This has led some theorists to connect the advent of old age with atrophy of the thyroid gland. The theory is reinforced by the fact, that there is a striking analogy between the signs of advanced old age and those of myxœdema. The falling of the hair and dropping out of the teeth, the dry and wrinkled skin, the lowered temperature of the body, the diminished perspiration, the indolent digestion and consequent emaciation; the reduced metabolism and consequent primary deposit of fat, followed by emaciation; the atrophy of the sexual organs, decrease of mental power, and the diminution in activity of the entire nervous system; the retention of calcium salts leading to atheromatous changes in the arteries, etc.—all these are signs of thyroid deficiency and of old age. In fact, old age is due, at any rate in part, to degeneration of the thyroid gland, while myxœdema may be described as a condition of premature senility.

The two conditions of cretinism and myxœdema result from the absence of thyroid secretion. Short of these, come the conditions grouped together under the heading "Thyroid inadequacy," which will be dealt with later.

Thyroid Excess.—Increased activity of the gland brings about nervous excitability, sleeplessness, tachycardia, reactive vaso-

motor system, and accelerated metabolism. Nitrogenous metabolism is increased, causing wasting, and glycosuria often occurs. It may be noted that wasting occurs, too, with thyroid deficiency, because digestion and absorption are at fault and metabolism is diminished. Patients suffering from thyroid excess are susceptible as well to adrenalin, which in them causes dilatation of the pupil, whilst in normal individuals it is without effect; a useful diagnostic reaction.

PATHOLOGY.

Myxœdema and Cretinism.—Mention has already been made of these conditions, which result from congenital absence, atrophy of parenchymatous degeneration, or after removal, by operation, of the gland.

Thyroiditis.—Acute inflammatory conditions of the thyroid gland are not common; it may become secondarily infected in the course of certain fevers, especially typhoid and pneumonia. One has seen considerable enlargement of the gland accompanying septic conditions, especially cases of severe pyorrhœa alveolaris. Whether this enlargement is due to a septic infection of the gland, or to an increased demand for the thyroid secretion, is not obvious, unless definite signs of inflammation—redness, œdema, or abscess formation—occur. Many cases of goitre are certainly cured after the removal of septic teeth or other infective foci.

Suppuration may occur in a thyroid cyst, when thrombosis and pyæmia are not uncommon sequelæ, owing to the presence of so many veins.

Tuberculous and gummatous affections of the gland also occur.

Goitre.—Under this heading one may include all enlargements of the gland not of an inflammatory nature, excepting those which occur during menstruation and pregnancy normally; these are physiological and not pathological.

The pathological goitres are usually classified as:—

1. Simple or parenchymatous.
2. Adenomatous.
3. Cystic.
4. Malignant.

The clinical and histological appearances of these goitres

are well known. There is no relation between the size of the gland and the symptoms produced. Thus, we may find myxœdema and Graves's disease with or without a goitre. There may be pressure symptoms from a small adenoma in the isthmus, whilst a goitre 10 times its size in one of the lateral lobes may cause no inconvenience at all. In one case, goitre may be the result of hyperplasia of functionally active thyroid tissue; in another, it may mean a degenerative process leading to suppression of the normal thyroid function.

The possibility of these pathological enlargements occurring in retrotracheal, retroclavicular, and retrosternal thyroid tissue, should not be forgotten.

The sudden development of a thyroid tumour, points to hæmorrhage in the gland substance.

Graves's disease.—The symptoms of this too common disease need no description. The goitre, which is usually present to a varying extent, is of the parenchymatous variety, resembling very closely the colloid goitre seen after double oöphorectomy.

A theory which suggests itself, as to the causation of this disease, is that some underlying condition produces a profound disturbance in the normal perfect balance which exists between the actions of the various internal secretory organs—more especially the thyroid, pituitary, and suprarenals—upon the metabolism of the body. Sometimes one gland, sometimes another is left in the ascendancy, and so the symptoms of this disease vary in the characteristic fashion. Most frequently the thyroid predominates, and yet Graves's disease may occur without any goitre at all. It is commonly accepted that this disease is due to a disturbance in the action of the thyroid gland alone for the reason that this gland is always before the eye. Hardly any two cases of Graves's disease are alike, and no disease varies more in its response to different lines of treatment. The underlying cause which most forcibly suggests itself is a sexual one. The disease is most common in women, in whom the sexual apparatus is the more unstable. It is confined almost entirely to the sexual life of the woman, and is accompanied almost invariably with sexual disturbances. It commonly follows some great demand made upon the sexual organs, *e.g.* the onset of menstruation, the

beginning of married life, pregnancy, or the cessation of menstruation at the menopause.

There is a condition which very closely resembles Graves's disease in some of its symptoms, and yet all the classical symptoms are absent; and it undoubtedly has a sexual origin. I mean the condition so often seen in the young mother after the birth of her first baby. From being a fresh-coloured, active, well-proportioned girl, she becomes a pale, thin, easily worried woman. Her day is one continual restless bustle, for she never has time to get through all she has to do; as one patient expressed it to me, "if the night was only added on to my day I might possibly get finished." Yet, when analysed, their pressing engagements are nothing but trivial matters. The hair becomes thin, sometimes grey, easily falls out, and is very greasy; profuse night sweats occur, the appetite goes, and, no matter what is taken, flesh is steadily lost until the bed rock is reached, when she can become no thinner. These women always say, that during the time they are pregnant, they feel better than at any other time.

One has seen these cases develop a premature menopause, and eventually pass into typical Graves's disease. What more natural than to blame the sexual organs for this distressing condition, and what condition does the general practitioner more commonly meet with, which is so difficult to relieve with our present imperfect knowledge of the action of the various internal secretory organs? One thing is certain, that they do not improve under thyroid medication, although it does not seem to aggravate the condition. Lately, I have had considerable success, in an isolated case, by giving a preparation called triglandine (Duncan and Flockhart's), which is a tablet containing thyroid gr. i, suprarenalin, gr. $\frac{1}{3}$, pituitary, gr. $\frac{1}{20}$.

There is an interesting group of cases, which is classed under the heading of "thyroid inadequacy." These cases vary from mild myxœdema to such ordinary complaints as headache. The commoner symptoms of the disorder are:—malnutrition; varying degrees of alopecia, of which the most constant is a thinning or absence of the hair in the outer one-third of the eyebrows, and known as the "eyebrow sign;" decay of the teeth, and brittle nails; the feeling

of being born tired; articular and muscular pains; poor circulation, cold extremities, and a tendency to chilblains; constipation and nocturnal enuresis; asthma, dyspnoea; neuralgia, headache, migraine, noises in the ears, somnolence, and obesity; various skin affections; infantilism of the sexual organs, cryptorchidism, mastodynia, varying menstrual disorders from amenorrhoea to menorrhagia with passage of clots, and leucorrhoea. The majority of these symptoms are met with commonly in one's patients, and will respond, with varying degrees of success, to thyroid medication.

TREATMENT.

The surgical treatment of affections of the thyroid gland is eminently satisfactory. A patient presents herself with an adenoma of the gland; it is removed, and no more is heard of it. Or, again, in some cases of exophthalmic goitre, a portion of the gland is removed, and the symptoms subside. This is not the case with the medicinal treatment; some brilliant results have been obtained, but on the whole the results are disappointing, chiefly, no doubt, because one is apt to blame the thyroid for conditions it has no part in producing.

The preparations usually employed in medicinal treatment are the tabloids, the doses being measured in grains of the fresh gland. The relation of fresh gland to dried extract is approximately 3 : 1, so that 3 grains of fresh gland are equivalent to 1 grain of the dried extract. It is important in prescribing thyroid extract to remember this, and to state on the prescription the preparation required. Another convenient preparation is the Elixir Colloid (Squire)¹ (in which 5i is equivalent to grs. v.).

I will briefly describe a few cases I have come across, which will illustrate my own line of treatment, about which I know most.

Surgically, my experience is limited to the removal of adenomata and cysts. The operation is straightforward, and the result, I hope, obvious and needs no description.

Among the *non-surgical cases* I would mention:—

(a) By far the commonest group, the *Varying Degrees of Thyroid Enlargement accompanying the onset of Menstruation*.—

¹ Old people take thyroid extract badly.

These goitres almost invariably disappear after the administration of a tabloid equivalent to $2\frac{1}{2}$ grains of the fresh thyroid gland, three times a day, with or without painting of the gland with iodine—Lin. iod. 1 part, water 4 parts.

(b) *Exophthalmic Goitre.*

Mrs. S. developed severe exophthalmic goitre after the birth of her first child. She had all the classical symptoms, and so severe was the cardiovascular derangement, that she developed a loud mitral regurgitant murmur. There was a strong strain of thyroid inadequacy among her symptoms, however, so I decided to try her on thyroid medication. In addition, she drank two quarts of milk a day, an important point in the treatment of hyperthyroidism, on account of the constant drain of calcium salts from the body in these cases. She began on tabloids of $\frac{1}{2}$ grain of fresh gland twice a day, and gradually worked up to $2\frac{1}{2}$ grains three times a day. The result was nothing short of marvellous. Every symptom, except the mitral murmur, disappeared, including the exophthalmos, and menstruation, which had been absent, returned to normal. This latter was the first sign of improvement. She has since consulted me about the risks of having another child, and I have advised against it, although, as in the following case, pregnancy sometimes relieves the condition.

Mrs. G. developed exophthalmic goitre for no apparent reason. She got married, and became pregnant. During the second half of her pregnancy, the symptoms abated. This point is interesting, because the thyroid is said to be active during the first half of pregnancy, and the suprarenals and pituitary during the second. She had a second baby a few days ago, and now she has no symptoms of her original complaint, except a slightly widened palpebral fissure. This, however, is not the common experience; one has come across other cases in which pregnancy has distinctly aggravated the symptoms. Personally, I have not noted any tendency to post parturient hæmorrhage, which is said to occur in exophthalmic goitre cases owing to the deficiency of calcium salts.

Mrs. H. came under my care, in hospital, with exophthalmic goitre, being two months pregnant. She was treated by exposing the gland to the action of X-rays without benefit. She went home, and was lost sight of. X-rays have, however, proved very useful in reducing large parenchymatous goitres. In one case, in which they were tried on an adenoma apparently pressing on the trachea and causing exophthalmic symptoms; although no benefit was noticed, they did not interfere with a subsequent surgical operation, as it is stated they may do, by the formation of adhesions.

The pressure symptoms in this case were not improved by the removal of the adenoma, but the patient has a dull area over the upper part of the sternum which suggests that the dyspnœa may be caused by the pressure of a retrosternal enlargement of thyroid tissue. I have not, however, carried my investigations any further.

Mr. P., aged 59, began his illness with lumbago followed by sciatica.

He got better, and when next seen had lost $1\frac{1}{2}$ stone in weight in less than two months. He was found to be passing sugar in his urine, and was put on a diet. The sugar disappeared, but he began to develop distinct signs of hyperthyroidism, and continued to lose weight. Thyroid medication aggravated his symptoms at once, but he eventually got very much better—well enough to return to his duties—on Syr. Glycerophosph. Co. which is rich in calcium. I need hardly say that every effort was made to discover any other possible cause for his condition without result.

Mrs. R., another case of exophthalmic goitre, developed glycosuria from which she died.

(c) Two or three cases of *goitre in middle-aged women* have improved markedly under the influence of thymus extract given in tabloids of 5 grains.

Mrs. F. consulted me for severe rheumatoid pains, chiefly in the cervical joints and lower limbs. She complained too of loss of hair, constipation, lassitude, passage of clots at menstrual periods, and leucorrhœa. She has two sisters suffering from exophthalmic goitre, and a baby with cryptorchidism. She is showing some improvement under thyroid medication, starting on $\frac{1}{2}$ gr. of fresh gland three times a day and gradually working up the dose. Previous to my seeing her, she had gone through every other known form of treatment without benefit.

Miss R. was suffering from a large parenchymatous goitre with foul pyorrhœa alveolaris. The goitre completely disappeared after the mouth had been cleared.

Mr. P. was another case of the same kind. But he unfortunately developed septic pneumonia just after the last batch of teeth had been abstracted, after which an empyema developed from which the patient died.

(d) In children, the results are often most gratifying. Pale children, with no appetite, slow in thought and speech, slack and easily tired, will often improve bodily and mentally to an astonishing degree on $\frac{1}{2}$ gr. of fresh thyroid gland, three times a day.

Another class of case is the child with a perpetually dirty tongue, no matter what is done for it. These tongues get clean under thyroid treatment.

An interesting case was that of a boy, D.S., aged 9, who came home from school with a dilated heart, and a mitral bruit. Rest in bed and ordinary medicines were useless. I then found out that, shut away in a room in the house and never produced, was a cretin brother. On the supposition that my patient might also be deficient in thyroid, he was given $\frac{1}{2}$ gr. of the fresh gland three times a day. He improved straight away. The heart came back to its normal position, and the bruit disappeared.

I do not attempt to explain the action of the thyroid

extract here, unless it was that the heart muscle had become infiltrated with mucin, as in myxœdema, and so had dilated under the stress of a boy's life at school.

(e) The many cases of *amenorrhœa* and other *menstrual irregularities*, which are benefited by thyroid medication, are, in my small experience, equalled in number by those that are not benefited to any appreciable degree.

(f) Mr. P. had *chronic renal trouble* with right-sided hemiplegia, and was myxœdematous. This patient has lost stone after stone in weight under thyroid medication, $1\frac{1}{2}$ grs. of fresh glands three times a day, and has improved in bodily health as well. His reduction in weight has greatly facilitated his movements. No doubt had thyroid been given earlier, he might have been saved his hemiplegia, for I have found it most useful in reducing blood pressure. This patient at one time had a blood pressure of between 210 and 220 mm., it is now down to 185.

(g) Mrs. G. was a patient suffering from severe *spasmodic asthma*, from which she could get no relief. She had a hard fibrotic thyroid, and was typically myxœdematous with a blood-pressure of 210 mm., urine normal. Under thyroid medication the "asthma" got very much better, and, when I last saw her, was practically gone.

Lastly, I have now under treatment the following case :—

Mrs. D., aged 21. Catamenia at 15. Regular till 18, then irregular. Married at 19, became more irregular, and, when she came to me a few weeks ago, had seen nothing for eight months, except once. She has got very much stouter. Three to four years ago she weighed 7 stone, and now weighs 9 stone 11 pounds. Four years ago, she lost all her hair, but it came back again quickly, and is now thicker and stronger than ever, but very greasy. She always feels tired, is not constipated, and has a poor appetite. Pulse 100. She has fine tremors in fingers, perspires very freely, her hands being constantly wet, and is not pregnant.

This is a case with mixed symptoms, so I have started her on tab. triglandine (mild), which contains thyroid, gr. i; supra-renaline gr. $\frac{1}{3}$; pituitary $8\frac{1}{2}$.

After one week's treatment she lost 5 lbs. in weight, but her symptoms were unaltered. During the second week—up to last Monday—she lost $3\frac{1}{2}$ lbs. more, making $8\frac{1}{2}$ lbs. in a fortnight. Although there has been no other change in her condition up to the present, I feel confident that menstruation will soon begin again, and with the onset of menstruation there will be a loss of her other symptoms, fatigue, loss of appetite, etc.

THREE CASES OF GALL-STONES, WITH REMARKS ON THE RARITY OF THE CONDITION IN TRINIDAD, B.W.I.

By R. SEHEULT, M.D.

Resident Surgeon, Colonial Hospital, Port-of-Spain, Trinidad.

CASE I.

THE patient, a somewhat anæmic and poorly nourished multipara, aged 60 years, was admitted to hospital under my care on February 26th, 1912, with a history of pain in the epigastrium, more or less continuously present, but with occasional acute exacerbations—for four months; there were also slight jaundice and vomiting; no history of rigor or fever was elicited. Nine years previously, vaginal hysterectomy was performed on her for cancer of the uterus.

On admission, she complained of an acute agonizing pain referred to the right hypochondrium and radiating to the epigastric region. The conjunctivæ were only slightly tinged yellow, but a few days later jaundice became quite evident; her temperature was normal, and pulse 90 per minute and intermittent; there was no cardiac murmur. Examination of the abdomen, which was flaccid, revealed nothing abnormal except slight enlargement of the liver and tenderness on pressure over the gall-bladder; her urine was free from albumen, but contained some bile. A diagnosis of gall-stones was made, with a lurking suspicion of malignant disease.

On March 3rd, 1912, under chloroform, laparotomy was performed, Mayo Robson's incision being adopted. Dense adhesions were encountered in the neighbourhood of the gall-bladder implicating the omentum and colon. The bile ducts were buried in a mass of adhesions; these were carefully separated and the ducts liberated, the cystic duct being especially involved in the matting of the tissues. The gall-bladder and ducts were explored, but no gall-stones were felt in them; the head of the pancreas was considerably enlarged and extremely hard. After controlling all hæmorrhage, the abdominal cavity was closed.

The after-history of the case was uneventful; convalescence ran a smooth course, jaundice and pain disappeared completely, and the patient was discharged well on March 29th, 26 days after operation. There has been no recurrence of her symptoms; she was last seen by me in July, 1914, and was in perfect health.

CASE 2.

This case was an emaciated and weakly multipara, aged 45 years, who was born in Barbados, and arrived in Trinidad when she was six years old. She was admitted to hospital on October 20th, 1913, with a history

of recurrent attacks of pain in the epigastrium for about two years. The pain was generally accompanied by rigor, fever, and vomiting; jaundice, which followed the first attack, had never cleared up completely and became more marked after each paroxysm; the bowels were usually costive. Owing to the ague-like character of the attacks, her condition had apparently been attributed to malaria.

On admission, the patient was deeply jaundiced, and complained of severe pain in the epigastrium; temperature 101° F., and pulse 110 per minute; tongue coated with a brownish fur. On examination of the abdomen, a firm, tender mass was felt just below the right costal margin; the liver was slightly enlarged and tender, and its surface uneven; there was also enlargement of the spleen; in the peritoneal cavity was some free fluid, and bile was present in the urine, which was free from albumen. Operation was proposed to the patient, but she absolutely refused consent. Under medical treatment, all her symptoms gradually subsided, and by November 19th, 1913, the jaundice had faded away to a considerable extent, and the pain had greatly diminished in severity. The motions, which had been pale-coloured, were now bile-stained, and the urine showed less bile pigments; temperature and pulse normal, the liver much reduced in size and no longer tender. The mass in the hypochondrium could still be felt, and was tender on pressure, but the ascites had become more pronounced. Improvement was maintained until December 3rd, 1913, when there was a recurrence of all her previous symptoms; pain on this occasion was not very acute, but the attack was ushered in by a severe rigor followed by a temperature of 101.6° F., increased pulse rate, deepening of the pre-existing jaundice, and looseness of bowels. Under treatment she again recovered, but ascites continued to increase, necessitating paracentesis abdominis on December 12th, when several pints of clear yellowish fluid were withdrawn.

Four days later, a very severe paroxysm of pain, associated with the usual symptoms, having recurred, the patient decided to submit to operation. Under chloroform, when the abdomen was opened, the liver was found to be very cirrhotic, and the gall-bladder small, contracted, and empty. After freeing all adhesions involving omentum, transverse colon, and the bile ducts, a large irregularly shaped and somewhat movable stone was felt at the commencement of the common bile duct, which was incised and the stone removed; the dilated duct, which readily admitted the finger, was then explored upwards and downwards, but no other calculi were found. A soft tube was introduced into the common bile duct, secured in position by a catgut ligature, and the remaining incision in the duct having been sutured in the usual way, the abdomen was closed and the tube again fixed to the skin incision with silk. Bile escaped very freely through the tube during the 14 days it was kept *in situ*, and after its removal the dressings were stained for a few days, until January the 10th, when the fistula had completely closed. Although the patient had been relieved of her symptoms, fluid reaccumulated in the peritoneal cavity, so that the abdomen had to be tapped a second time for the relief of this symptom on January 21st. Three days later the patient was discharged; she had been entirely free from pain and jaundice for two weeks previously. She was last seen by me on October 29th, 1914, and was in good health. There had been no recurrence of pain or other symptoms pointing to her old

trouble, nor any evidence of ascites.

CASE 3.

A well-nourished multipara, aged 50 years, was admitted on June 12th, 1914, with the following history. Apart from slight dyspeptic symptoms, which began to show themselves about a year previously, she had enjoyed good health until January, 1914, when she was suddenly attacked with severe pain in the epigastrium associated with vomiting, but there was no fever or jaundice. The pain lasted for about a month, and the vomiting off and on for about two weeks, with rapid and considerable loss of flesh. After the attack had subsided, she regained her usual health, and resumed work on April 1st, as wardmaid at the hospital.

On June 12th, whilst at work, she was again suddenly seized with a very violent pain, referred to the right hypochondrium and accompanied by vomiting. When she came under my care that day, her temperature was normal, and her pulse 110 per minute. On the evening of the 14th June, her temperature rose to 99° F., and on the following evening to 99°·8 F., subsequently becoming normal. Vomiting ceased after 48 hours but the pain continued for several days. Examination of the abdomen showed a prominent swelling in the region of the gall-bladder; it was about the size of a lemon, hard, rounded, and tender, without any appreciable enlargement of the liver, and the spleen appeared of normal size. The attack was not followed by jaundice; the motions were yellow, and there was practically no bile in the urine, which was also free from albumen. The patient was prepared for operation, but as her menses suddenly appeared, it was postponed. On June 26th, the abdomen was opened, under chloroform, by the usual incision according to Mayo Robson's method. As in the two previous cases, firm and dense adhesions were encountered, especially around the gall-bladder, which formed a large and remarkable indurated mass giving at first the impression of malignancy. The adhesions were cleared, the gall-bladder brought into view, and, after taking the usual precautions to prevent soiling the field of operation, it was incised, a large, smooth, oval stone, tightly embraced by it, being extruded. There was no suppuration. A search was made for other calculi, but none were detected. A large drainage tube was placed in the gall-bladder and fixed in position by catgut, and the incision in its wall sutured; the abdominal wound was then closed, the tube being secured to the skin incision by a silk ligature and connected by means of a glass cannula and rubber tubing with a bottle at the side of the bed to receive the discharge. After the operation the patient was somewhat collapsed, but she soon rallied and made an uninterrupted recovery. For several days there was a very copious discharge of bile through the tube but after its removal on July 10th, the fistula closed spontaneously a week later, and the patient was discharged well on August 10th, 1914. She resumed the duties of wardmaid at the hospital on October 1st, 1914.

REMARKS.

These cases present one or two features of interest. First, the condition occurred in multiparous women, whose ages ranged

between 45 and 60 years; this is entirely in accord with general experience elsewhere. The records of this hospital show, however, that over a period of 10 years there was no difference in the sexes with regard to the incidence of the affection (*see* attached return). Secondly, a different surgical procedure was demanded in each case, for the seat of mischief in the biliary tract varied. In the first case, a simple laparotomy and freeing of adhesions brought permanent relief to the patient, whose symptoms may have been due to adhesions between the gall-bladder and the neighbouring viscera, or to kinking of the cystic duct produced by the contraction of the adhesions. It seems remarkable, however, that a permanent cure should result from merely liberating adhesions which one would expect to re-form with consequent recurrence of symptoms. I am inclined to think that during the manipulations in the course of the operation a small undetected concretion was dislodged, and eventually found its way into the duodenum. I have, on this supposition, ventured to consider this case as one of gall-stone. The stools, unfortunately, were not examined for calculi.

As regards the other two cases, there was no room for doubt about the exact nature and seat of the lesions. In one case, choledochotomy was necessary to extract from the common bile duct a large irregularly shaped stone weighing 140 grains when dry; while in the other cholecystotomy was performed, and a good sized calculus of smooth contour and oval in shape was removed from the gall-bladder itself. This calculus was 2 inches in length, measured 3 inches at its widest circumference, and weighed when dry 186 grains. The report of the Government analyst, which is attached to this paper, shows that these two calculi consisted mainly of cholesterol. It is interesting to note the presence of copper in one case.

Thirdly, the question of malignancy arose in each case and had to be considered. In the first case, the symptoms, general condition, and age of the patient, in association with her previous history, aroused some suspicion of malignant disease, which was accentuated during the operation owing to the absence of gall-stones, and especially when the head of the pancreas was found to be enlarged and intensely indurated. The subsequent history of this case has shown that this condition was merely

chronic pancreatitis. In the second case, emaciation and debility, accompanied by ascites, and the other symptoms enumerated, suggested a malignant growth; for though the paroxysmal character of the attacks and the nature of the symptoms pointed to gall-stones, the presence of carcinoma at least as an associated lesion appeared for a time probable. In the third case, malignant disease was suspected only when the abdomen was opened, and an extremely hard mass around the gall-bladder came into view. When the adhesions were separated, permitting a large stone to be felt in the gall-bladder, the true nature of the case became apparent, and the suspicion of malignancy dispelled.

While cholelithiasis, so far as its causes and preventive treatment are concerned, lies entirely within the province of the physician, the tendency to draw it within the domain of surgery becomes irresistible, as soon as it is found to exist in its more pronounced and material forms. The advance of surgery and the brilliant results, which have been obtained in this field of operative work, make it almost imperative to transfer to the care of the surgeon—except in the case of grave contra-indications—the treatment of these conditions before serious complications supervene, and prospects of success thereby become less favourable.

GALL-STONES IN THE WEST INDIES.

Before concluding this paper, I should like to refer to the incidence of gall-stones in this colony.

Post-mortem statistics of various European hospitals show that gall-stones are present in from 5 to 12 per cent. of all cases, and, according to some authorities, they occur once in every six subjects over 60 years of age. Statistics from America point to the same conclusion. A review of the record of a thousand autopsies made in the Johns Hopkins Hospital, Baltimore, showed that gall-stones were found in 59 per cent. I have searched the medical and surgical records of the Colonial Hospital, Port-of-Spain, and have not been able to collect more than 11 cases of gall-stones among 64,126 admissions to that institution during the decade 1904-1914. Of these 11 patients, six were males and five were females, whose ages ranged from 19 to 69. The post-mortem records for the same period show that of 7,557 autopsies, gall-stones were

found in only five subjects. Curiously enough, all were males, and the condition in four of these cases was associated with some complication—empyema of the gall-bladder, suppurative appendicitis, carcinoma of the gall-bladder, and suppurative cholangitis occurring in each respectively. The liver in the last case showed a large number of gall-stones within its substance in the smaller branches of the hepatic ducts; these intra-hepatic ducts were greatly dilated, some of them admitting the tip of the little finger. The concretions consisted almost entirely of bile pigment.

From the above figures, it would appear that gall-stones occur very rarely in Trinidad. No doubt, through faulty diagnosis or incomplete and careless post-mortem examinations, there may have been cases that escape notice, but, making every allowance for such errors, it may be accepted, I think, that the affection is very seldom encountered in this colony.

There is, I believe, general agreement that infection of the biliary tract and obstruction to the flow of bile are necessary factors in the ætiology of gall-stones. Predisposing conditions, however, may explain the variations in the incidence of the disease in different countries. Diet, sedentary habits, and tight lacing are said to contribute to the development of biliary calculi, and it is stated that on account of child-bearing and a tendency to atonic constipation, gall-stones are much more common in females than in males—in the proportion of about four to one. As regards diet, some observers hold that fatty, saccharine, and starchy foods favour the production of gall-stones, whereas a nitrogenous diet diminishes this tendency. Others maintain that fats and albuminous substances increase the cholesterin contents of the bile, and so encourage the formation of biliary calculi. Others, again, hold that the character of the food we eat exercises no direct influence on the causation of gall-stones, but that any diet which tends to induce catarrh of the stomach and duodenum would favour the risk of the invasion of microbes from the intestine into the common bile duct, and so indirectly promote the condition. In this colony, the diet of the labouring population—including the East Indians, who form one-third of the population, estimated at 330,000—is defective in nitrogenous constituents. The staple food of the East Indian immigrants, or “coolies,” as they are called here, is rice, which is rich in starch and poor

in proteins; they use coconut oil for cooking purposes. The native labourer, on the other hand, subsists mainly on sweet potatoes, tania, yam, and other farinaceous foods; their consumption of animal food is sparing, and is almost confined to the use of salt fish. In this sugar-producing colony, sugar enters largely into the dietary of all classes.

These facts do not favour the first view enunciated above, but they rather support the observation that food poor in albumen tends to diminish the incidence of gall-stones. On the other hand, in view of the ingestion of an excess of carbohydrates here and the consequent liability to abnormal fermentative changes in the stomach, one would expect cholelithiasis to be more common in the colony than it appears to be, if the third theory advanced above be maintained.

I am inclined to think that the habit which obtains among our people of ingesting large quantities of water may be a point of some importance in the ætiology of this condition, for it is well known that abundance of water promotes a sort of "washing" of the various tissues of the body, and may have a solvent action on metabolic products. Sedentary habits are more commonly contracted in the warm and enervating climate of the tropics than in that of more temperature zones; this lack of exercise is often associated with dyspepsia and other intestinal disorders, which are frequently met with here. Yet, in spite of these influences which are considered favourable to the development of gall-stones, there remains the fact that the condition is very uncommon in this island.

In discussing the ætiology of cholelithiasis, some authorities lay stress on tight lacing, and perhaps the absence of corsets among the bulk of the population may account to some extent for the rarity of the condition here, but in this connexion it is also interesting to note that males and females are almost equally affected by the disease in this colony.

Department of Agriculture,
Government Laboratory,
17th September, 1914.

REPORT.

Sample of gall-stones received from the Resident Surgeon, Colonial Hospital.

Sample 370.

Hospital description: (A) Removed from the common bile duct.

Weight, 140 grains = 9.3 grammes.

Percentage composition :—

Cholesterol	-	-	-	-	-	81.0
Bile pigments (mainly bilirubin)	-	-	-	-	-	—
Glycocholic and taurocholic acids, ¹ etc.	-	-	-	-	-	13.9
Ash (oxides, sulphates, chlorides, and phosphates of sodium, potassium, calcium, magnesium, copper and iron) ²	-	-	-	-	-	5.1
						100.0

The percentage of copper in the gall-stone is 0.62. It occurs in a form insoluble in water, and probably exists either as a copper salt of an organic bile acid or in combination with bile pigment.

Sample 371.

Hospital description : (B) Removed from gall-bladder. Weight, 186 grains = 12.4 grammes.

Percentage composition :—

Cholesterol	-	-	-	-	-	89.0
Bile pigments, etc. (mainly bilirubin)	-	-	-	-	-	9.2
Ash (carbonates, chlorides, and sulphate of calcium, iron, sodium and potassium, mainly calcium carbonate)	-	-	-	-	-	1.8
						100.0

Sample 372.

Hospital description : (C) Removed from intrahepatic duct.

Percentage composition :—

Bile pigments, etc. (mainly bilirubin)	-	-	-	-	-	98.9
Ash (mainly calcium oxide; traces of iron oxide)	-	-	-	-	-	1.1
						100.0

(Signed) HERBERT S. SHREWSBURY, H.C.F.C.S.,
Acting Government Analyst.

¹ Exist largely as sodium and potassium salts, etc., in original stone.

² Sulphates and oxides largely derived from combustion of sodium taurocholate, etc.

THREE CASES OF GALL-STONES.

715

RETURN SHOWING NUMBER OF CASES OF BILIARY CALCULI TREATED IN THE
COLONIAL HOSPITAL, PORT-OF-SPAIN, TRINIDAD, FROM 1ST APRIL, 1904
TO 31ST MARCH, 1914.

Year.	Name.	Sex.	Age.	Birth- place.	Result.	Remarks.
1904-5	N. B.	M.	19	Barbados	Died	Post-mortem examina- tion showed numerous calculi in gall-bladder.
	L. G.	M.	25	China	Died	Post-mortem examina- tion showed suppurative pancreatitis and one large stone in gall- bladder.
1907-8	J. Y.	M.	23	Barbados	Relieved	Discharged relieved.
1910-11	L. L.	F.	31	Venezuela	Relieved	Discharged relieved.
	W. D.	M.	40	Dominica	Died	Post-mortem examina- tion showed gall- stones in intra hepatic duct and suppurative cholangitis.
1911-12	S.	F.	42	Trinidad	Relieved	Discharged relieved.
	M. R.	F.	56	Trinidad	Relieved	Discharged relieved.
	A. G.	M.	69	Tobago	Died	Post-mortem examina- tion showed one large stone in gall-bladder and cancer of gall- bladder.
	O. F.	F.	60	Trinidad	Relieved	First case referred to in report (doubtful).
1912-13	F. S.	M.	52	St. Vincent	Died	Post-mortem examina- tion showed numerous calculi in gall-bladder and empyema of gall- bladder.
1913-14	R. D.	F.	45	Barbados	Relieved	Second case referred to in report.



Practical Notes.

SUBCUTANEOUS INJECTIONS OF OXYGEN IN CARBONIC OXIDE POISONING.

Pic and Paul Durand report the case of a young woman, who had tried to commit suicide by inhaling coal-gas, and had been brought to the hospital quite comatose. Subcutaneous injections of oxygen were given at once, and were continued until the next day, with a short interval during the night. 230 litres of oxygen were given in this way, and recovery was very quickly obtained. This amount of oxygen was injected in the course of 22 hours and gave rise to no ill effects except a generalized emphysema. There was no dyspnoea, which is attributed to the oxygen satisfying the air-hunger of the tissues. The patient was not bled, because, although recommended for medico-legal purposes, the removal of useless carboxyhæmoglobin, from the therapeutic point of view, entails the loss of indispensable hæmoglobin. The volume of the blood in carbonic oxide poisoning should not be reduced. It is functionally anæmic, and the toxicity of carboxy-hæmoglobin has not been proved.

The complete disappearance of carbonic oxide from the blood was found to have been effected at the end of 24 hours. In cases which have been given inhalations of oxygen or pure air, traces of carbonic oxide have been found in the blood five or six days after the intoxication.—(*Journ. de Méd. et de Chir. prat.*, 25 June, 1915.)

TREATMENT OF CHRONIC PROSTATITIS.

Kantorowicz recommends the following suppositories as useful in the treatment of prostatitis:—

1. *R.* Argenti nitratis - - - - - gr. i.
Cocainæ hydrochloridi - - - - - gr. ii.
Olei theobromatis - - - - - ʒiiss.

Misce. Fiant suppositoria No. VI.

Sig. "One to be inserted at bed-time."

2. *R.* Zinci acetatis - - - - - gr. iss.
Aluminis - - - - - gr. iss.
Olei theobromatis - - - - - ʒiiss.

Misce. Fiant suppositoria No. X.

Sig. "One to be inserted twice a day."

3. *R.* Iodi - - - - - gr. v.
Paraffini mollis - - - - - gr. xxxvi.
Olei theobromatis - - - - - ʒiiss.

Misce. Fiant suppositoria No. XII.

Sig. "One to be inserted two or three times a day."

The first should be used in the early stages of the affection, and the

other two later on. The suppositories should be passed up as high as possible in the rectum. Massage of the prostate is of benefit, and, if it can be borne, should be carried out two or three times a week for several weeks.—(*New York Med. Journ.*)

FOR TABETIC PAINS.

Mueller recommends the use of the following as an intra-muscular injection:—

℞ Thiosinamin	-	-	-	-	-	gr. xv.
Sodii salicylatis	-	-	-	-	-	gr. xxx.
Glycerini	-	-	-	-	-	℥ xv.
Aq. destill. steril.	-	-	-	-	-	℥iiss.

Misce. Fiat injectio.

"One c.c. to be injected intra-muscularly every day or every other day."—(*Riforma Medica.*)

CHRONIC LARYNGITIS.

A chronic laryngitis, which is neither tuberculous nor syphilitic, can easily be cured, if the patient will give up his faulty habits. No alcohol and no smoking should be allowed, but most patients will not carry this out. Leon Berlin recommends the use of the following:—

℞ Tincturæ Benzoini	-	-	-	-	-	℥iv.
Aq. Laurocerasi	-	-	-	-	-	℥vi.
Aq. -	-	-	-	-	-	ad ℥iv.

Misce. Fiat mistura.

One tea-spoonful of this mixture is added to a bowl full of boiling water, which is then covered with the broad end of a funnel and the steam inhaled through the stem for five minutes. This should be done four times a day, and the patient must remain in his room without speaking for a quarter-of-an-hour afterwards.

When there is an abundant but tenacious secretion, the steam-spray should be used, two table-spoonfuls of the following being placed in the receptacle.

℞ Sodii boratis	-	-	-	-	-	℥i.
Glycerini	-	-	-	-	-	℥j.
Aq. Laurocerasi	-	-	-	-	-	℥iiss.
Aq. -	-	-	-	-	-	℥viiij.

Misce.

Or,

℞ Sodii boratis.						
Sodii benzoatis	-	-	-	-	ana	℥i.
Gomenol	-	-	-	-	-	℥iv.
Glycerini	-	-	-	-	-	℥i.
Aq. -	-	-	-	-	-	℥xvi.

Misce.

The throat may be sprayed with Vichy or la Bourboule water. Intra-

laryngeal injections of menthol (1 per cent.) in oil, or of gomenol (1 per cent.) in oil are useful; the latter will be found less irritating. A 1 per cent. aqueous solution of protargol is sometimes effective as a spray.

If the mucous membrane remains thickened and irregular, an application of one of the following, after cocaine, to the larynx should be made every two or three days: nitrate of silver in 1 per cent. then 2 per cent. and finally 10 per cent. solution; or chloride of zinc 2 per cent. then 10 per cent.—(*Journ. des Praticiens*, 26 June, 1915.)

TREATMENT OF CHRONIC BRONCHITIS.

The following suggestions by E. Hirtz are aimed at allaying the cough and promoting expectoration. To secure the first effect, the patient should have one medicine during the day and another during the night.

During the day he should take, between meals, one of the following pills every two hours:—

℞	Extracti Hyoscyami	-	-	-	gr. $\frac{1}{32}$
	Pulveris Ipecacuanhæ compositæ	-	-	-	gr. ss.
	Confect. Rosæ	-	-	-	q.s.

Through the night to quiet the cough he should take two to three tablespoonfuls of the following draught:—

℞	Syrupi Codeinæ	-	-	-	3v.
	Syrupi Tolutani	-	-	-	3v.
	Sodii bromidi	-	-	-	3i.
	Aq. destill.	-	-	-	3iiss.

Misce

An excellent sedative, which very often succeeds in stopping the spasmodic cough at night, is obtained by taking, two hours after dinner, a cachet containing:—

℞	Quininæ Valerianatis	-	-	-	gr. iiss.
	Pyramidon	-	-	-	gr. iv.

In the case of old people, a dose of gr. iss. of caffeine is added to this to obviate the depressing effect of pyramidon, which is always to be feared even in healthy subjects.

A suppository containing gr. $\frac{1}{8}$ th of morphine hydrochlorate is well borne by old people, and at the same time quiets the nightly spasm of the bladder in prostatic subjects.

To promote expectoration when coughing is not sufficient, and if the secretion requires to be made more fluid, the following draught should be taken in 24 hours.

℞	Ergotinæ	-	-	-	gr. viij.
	Antimonii Oxidi	-	-	-	gr. xv.
	Syrupi Lactucarii	-	-	-	3vj.
	Syrupi Ipecacuanhæ	-	-	-	3v.
	Aq. Laurocerasi	-	-	-	3j.
	Aq. Lactuæ	-	-	-	3iv.

Misce. Fiat haustus.

Or,

R	Antimonii Tartarati	-	-	-	-	gr. $\frac{1}{32}$
	Extracti Hyoscyami	-	-	-	-	gr. $\frac{1}{32}$
	Confect. Rosæ	-	-	-	-	q.s.

Misce. Fiat pilula.

"One to be taken each hour, up to twelve in the day."

Or,

	Ammoniaë Carbonatis.					
	Ammoniaci	-	-	-	ana	gr. xv.
	Pulveris Ipecacuanhæ	-	-	-	-	gr. iv.
	Extracti Hyoscyami	-	-	-	-	gr. iss.
	Acaciae Mucilaginis	-	-	-	-	q.s.

Misce. Fiat pilulæ No. xx.

"From two to five to be taken every day."—(*Journ. de Méd. et de Chir. prat.*, 10 September, 1915.)

INTRA-VENOUS INJECTIONS OF COLLOIDAL SULPHUR IN RHEUMATISM.

Loeper and Vahram recently reported the results of the treatment of acute rheumatism by intra-venous injections of colloidal sulphur. Given by the mouth or subcutaneously, it appears to decrease the pain and swelling. The results were encouraging but there were many failures. The authors therefore determined to try the effect of intra-venous injections, and carried out this treatment in over 300 patients in the military hospitals under their charge. The cases comprised all types of rheumatism, acute and chronic, articular and muscular, infectious and toxic. The injections given were 1 or 2 cc. of liquid containing 33 m.g. in each cc., and were made into a vein in the arm with all the usual precautions, the injection being made very slowly through a fine needle. No ill-effects were produced, and rapid improvement was obtained. The injections were repeated every day or every other day until a cure was obtained. In mild cases 1 or 2 are sufficient, in more severe cases 4 or 5, and in serious cases from 8 to 10. The pain is quickly relieved, usually in about 2 hours. There is a more or less brisk reaction. The swelling and any serous effusions disappear more gradually.

A further communication by the same authors and Berthomieu relates to the results obtained in chronic rheumatic affections of various kinds. A series of 10 injections, beginning with 1 cc. and increasing, was given, one each day, and the results were uniformly good. In obstinate cases, a second series may be necessary.—(*Le Progrès Médical*, Nos. 37 and 38, 1915.)

TREATMENT OF UTERINE FIBROMATA WITH THIOSINAMINE.

Artault recommends the use of thiosinamine for these growths, after an experience which began in 1903. All his patients have been relieved quickly, first of their pains and then of their metrorrhagia. Many of them felt so much better that they considered themselves cured, and left off the treatment, although the tumour was still present. To obtain a good

result, the treatment must be persevered with for weeks, or even months, for the effect upon the loss of blood requires a month or two to bring about. The tumour itself gets gradually smaller; during the first month of treatment, there is an appreciable reduction in size, but after this it is more gradual. Some have disappeared altogether in six or eight months, while others have got much smaller but have then apparently reached a stationary stage, in which all the symptoms have gone.

The solution used contains 10 per cent. of thiosinamine, with a little antipyrin, alcohol, and glycerine to make it more soluble. 1 cc. of this is injected at first, then 2, 3 or 4, two or three times a week according to how the patients can bear it. In addition, 20 drops are taken in a draught before each meal. If this solution causes too much pain, it must be replaced by one containing equal parts of thiosinamine and antipyrin. To one patient who was unable to go on with the treatment, Artault gave injections of colloidal sulphur with good results.—(*Bulletin Soc. Thérap.*, 14 April, 1915.)

TREATMENT OF PNEUMONIA IN CHILDREN.

Dana reports the results of the treatment of 44 cases of lobar pneumonia and 60 cases of broncho-pneumonia in children, the treatment of both diseases being on the same lines. Only two cases died out of this number. The home conditions were unfavourable, the patients living in tenement houses in a poor neighbourhood in Boston. The routine adopted was:— (1) Plenty of fresh air. (2) Regular and frequent feeding with small amounts of liquid or semi-solid food. (3) Saline enemata given hot twice a day, slowly. Calomel in divided doses was given for distension or constipation. (4) Cold applications to the chest, by wringing cloths out of cold water, applying them to the surface, and covering them with newspaper. These were renewed when they became warm. (5) A tepid sponge bath, followed by an alcohol rub, was given twice a day, if the temperature rose to 102° F. (6) When the temperature is high or is continued, 20 to 50 drops of brandy were given every 2 hours for a child from 1 to 3 years old. The brandy should not be given with food. (7) Anti-streptococcus serum was given twice a day with good results in a case in which streptococcal septicæmia was suspected. (8) The drug treatment was the routine use of ammonium chloride and syrup of ipecacuanha, the fluid extract of liquorice being used as the vehicle. One-quarter to half a drop of the syrup of ipecacuanha was given every 2 hours to children under 1 year. Above 1 year, 1 drop of the syrup was given for each year of the child's age every 2 hours, and 1 grain of ammonium chloride for all ages from 1 to 12 years. In the case of vomiting, one-quarter to half a drop of tincture of belladonna was given every 2 hours to children under 18 months old, one to one and a half being given to those over that age. When the heart's action was weak, one minim and a half doses of tincture of digitalis for each year of age were given every 4 hours. His reserve stimulant was strychnine in doses of $\frac{1}{100}$ th to $\frac{1}{1000}$ th of a grain every 4 hours.—(*Boston Med. and Surg. Journ.*, 14 January, 1915.)



Reviews of Books.

Diseases of the Arteries, including Angina Pectoris. By Sir CLIFFORD ALLBUTT, K.C.B., M.D., F.R.S., etc. Two volumes. Pp. 1,093. London: The Macmillan Co. 3os. net.

THE volumes before us represent the outcome of an important part of the author's life's work. We think Sir Clifford has acted wisely, while putting his previously published papers in book form, to retain their original casting; the result being, as the author modestly expresses it, "rather a string of dissertations than an orderly monograph."

We have here presented to us studies of arterial diseases made in the physiological laboratory, and at the bedside, together with pathological investigations on the subject. The whole constitutes a record of the work of an accomplished, scientific, and practical physician.

From a discussion on the physics of the circulation (chap. 2), wherein pressure-gauging by various instrumental methods is described and the great value of estimation of diastolic pressure insisted upon, the chapter concludes with a reiteration of the many fallacies and difficulties inseparable from external manometry. Special reference must be made to the succeeding chapter on the viscosity of the blood, in which many readers will find much which is new to them. The study of this subject would appear to have the promise of a harvest in the future.

In chap. 4, arteriosclerosis and blood pressure are exhaustively treated, and it is shown that arteriosclerosis may exist without increased blood-pressure or cardiac hypertrophy, especially in the decreascent forms of the disease and in cases of syphilitic origin.

In vol. 2 are chapters on cardiosclerosis and myocardial values, a subject which was not fully appreciated when attention was, for the most part, directed to valve lesions, and the expression "fatty degeneration" was used by the less observant as indicating the only cause of failing cardiac value.

The important bearing of cardiosclerosis and arteriosclerosis on manometric readings is best expressed in the author's own words (vol. 2, p. 3), "that in some 50 per cent. of cases of arteriosclerosis exorbitant pressures are never manifested from first to last."

Want of space forbids more than a passing reference to the succeeding chapters on aortitis and angina pectoris, in which Sir Clifford's well-known views on their causation are fully set forth.

The concluding chapters on diagnosis, prognosis, and treatment are of great practical interest, that on the latter subject showing the writer's full recognition that the physician's essential *métier* is to cure disease when possible and, failing this, to spare no effort to give relief.

In a future edition, we would suggest an amplification of the "Contents" and the inclusion of a complete index in both volumes, with a difference in weight of type to facilitate reference. The leaves should be cut, not only to save the reader's time, but because ragged edges are prone to

harbour dust and smut.

Urgent Symptoms in Medical Practice. By ROBERT SAUNDBY, M.D. Pp. 437.
London: Edward Arnold. 7s. 6d. net.

THE title of this book gives no indication as to its contents. It is a farrago of medical and surgical subjects. It would seem as though the author had kept a common-place book, and when he came across anything unusual he noted it down. In the book before us, he has arranged these notes in alphabetical order, filling up any lacunæ with descriptions of ordinary diseases. At the beginning of the volume, we come across a page and a half devoted to "Acne." By no stretch of the imagination can this be called an "urgent symptom." Again, although it is very interesting to read that "Dapple-grey horses always become white in a few years, and this peculiarity is a great source of trouble to the 2nd Dragoons (Royal Scots Greys), as a horse is said only to keep fit for the regiment for three years." yet this is hardly what we expected to find on reading the title of the book. We may say of the contents of the volume that they are like Mr. Weller's knowledge of London, "extensive and peculiar." Having made this criticism on the title, we are bound to state that much valuable information in an accessible form will reward the practitioner who turns to the book when in doubt as to the meaning of a word, the significance of a symptom or the best means of treating it. In any account of epistaxis, however short, attention should be directed to its occurrence in cases of arterio-sclerosis with high tension. Also it should be stated that the bleeding usually comes from a spot on the septum—the site of predilection. In the treatment of hiccough, no mention is made of chloretone; we have found this drug most useful in patients suffering from this symptom.

The author had evidently intended to devote sections to Stellwag's sign and to Von Graefe's sign, as he places (*q.v.*) after each in his article on Exophthalmic Goitre, but he has not carried out his intention, for on referring to these headings we find Stellwag's sign—see Exophthalmic Goitre and the same as regards Von Graefe's sign.

It cannot be said that the book adds to our stock of knowledge, but it will be found useful in refreshing the memory and suggesting measures of treatment.

Medical Jurisprudence and Toxicology. By Professor J. GLAISTER, M.D., F.R.S.E. Pp. 857. Edinburgh: E. and S. Livingstone. 15s. net.

THE third edition of this well-known book has been revised and enlarged. The subjects dealt with include medico-legal procedure and evidence, identification, deaths from violence, wounds, examination of blood-stains, questions pertaining to sex, lunacy, and poisoning. The sections relating to procedure in Scotland are particularly full and useful. In discussing English procedure with regard to coroners and inquests, the author advises medical men not to give information to coroners of deaths from violence, but simply to refuse a certificate of death, or to give a certificate stating explicitly the cause of death. Information would thus reach the coroner indirectly through the registrar. This advice is contrary to recognized practice, and is opposed to the recent pronouncement of the Royal College of Physicians regarding deaths from criminal abortion. I

is quite true that there is no statutory obligation upon medical practitioners to give information to coroners, but not doing so might cause serious delay in the investigation of deaths from crime or other forms of violence. In taking this view, the author has perhaps made scarcely sufficient allowance for the fact that in Scotland the practitioner is bound to send the certificate of death direct to the registrar, whereas in England he hands it to a responsible relative of the deceased.

The methods of identifying the living and the dead are described in great detail with numerous illustrative cases, many of which are drawn from the author's personal experience, and include instructive examples of mistaken identity. The chapters on death from various forms of violence are valuable, but more statistical information might have been included, and the statistics actually given are often seriously out of date, those, for example, relating to deaths from hanging and from drowning only having been brought up to 1894. The book is well illustrated, and can confidently be recommended to students and practitioners.

Text-book of Forensic Medicine and Toxicology. By R. J. M. BUCHANAN, M.D., F.R.C.P. Eighth edition, revised and enlarged. Pp. 417. Edinburgh: E. and S. Livingstone. 7s. 6d. net.

THIS book, though described on the title-page as above, is the eighth edition of the section relating to forensic medicine in Husband's well-known *Students' Hand-book of Forensic Medicine and Public Health*, the two parts now being issued separately. It is not an easy book to which to do justice. Medical jurisprudence is a subject which grows and changes rapidly; hence, in most cases the later editions of the earlier text-books are practically new books, the general custom being, as in "Taylor" or "Dixon Mann," to retain the time-honoured title, which eventually becomes almost the only connection with the original writer. In the work before us, the opposite plan has been followed. The title has been scrapped (save for an acknowledgment in the preface), while, on the other hand, a large proportion of the old material has been retained, page after page being identical word for word, with the sixth edition, the last which Husband himself revised. The drawback to this method of treatment is that it appears to place too much reliance upon the work of older writers, and gives an out-of-date atmosphere to the book. Thus, we find on almost every page references to and quotations from Caspar, Tardieu, De Vergie, Orfila, Christison and other pioneers, whose dicta cannot now be regarded as necessarily in accord with the most recent researches. The writer might with advantage have included more modern illustrative cases, such as the now classic Crippen case which is not referred to either under "scars" or identification; and he does not appear to be familiar with the work of Willcox on poisoning by veronal.

Some errors may be pointed out for correction in future editions. "Dickson Mann" (in the preface) should be spelt Dixon Mann; Grand Juries do not "cut the bill," they throw it out; a boy under 14 is still held by English law to be incapable of the crime of rape. The statement that "a candle will burn in an atmosphere containing 25 per cent. of CO₂ whereas 5 per cent. will cause death" now needs substantial modification. The reviewer has himself spent at least a quarter of an hour in a

mine shaft, where a candle would not burn, without experiencing any subjective symptoms whatever.

The general scope of treatment is not sufficient for the book to be regarded as a work of reference, but it may be useful to students.

The Vicious Circles of Neurasthenia and their Treatment. By JAMIESON B. HURRY, M.A., M.D. Pp. 90. London: J. and A. Churchill. 3s. 6d. net.

DR. HURRY, who has previously published another work on "Vicious Circles in Disease," has now written an interesting account of Neurasthenia viewed from this standpoint. Everyone knows how one set of symptoms influences another set in this disease, and Dr. Hurry emphasizes the importance of studying these interactions of the mind and the functions of the various organs of the body in order to enable the nature of the disorder to be better understood and more adequately treated. Illustrations of the vicious circles and the places at which attempts may be made to break them are given, and the book may be recommended as giving an interesting and sound account of the subject with which it deals.

The Early Diagnosis of Heart Failure. By T. STACEY WILSON, M.D., F.R.C.P. Pp. 596. Numerous drawings and charts. Demy 8vo. London: Smith Elder and Co. 12s. 6d. net.

THIS book consists of a collection of essays written during the last 20 years, and is the outcome of close clinical observation over an extended period.

Among the early signs of heart failure is yielding of the right ventricle, and, in the case where there is marked anæmia, there is dilatation of the conus arteriosus. Another significant sign given is that of increase of the cardiac impulse in the fourth left interspace. The dyspnœa of heart failure is differentiated from the breathlessness of anæmia by the amenability of the latter to iron.

The effects of overstrain on the ventricles, especially the right one, in adolescence and in the later periods of life are contrasted, the difference being shown to depend on the degree of distensibility which diminishes as age advances. In fatty hearts, there is a return of distensibility but not of elasticity. It is acknowledged that these periods cannot be sharply defined, since elasticity is in some cases retained until fairly late in life.

In discussing palpitation, an interesting case is given in which the symptom depended on reflex irritation originating in the colon.

The subject of percussion receives special attention, including the diagnostic value of decreased hepatic dulness as a sign of myocardial weakness or of deficiency in the volume of blood, and of upward extension of gastric resonance, indicating an abnormal rise in the diaphragm, as a guide to the volume of blood in active circulation.

Dr. Stacey Wilson has drawn upon his imagination in suggesting that globus hystericus may be due to the pressure of an over-distended left auricle on the œsophagus (page 14) and, later on (page 342) to pressure of a distended right ventricle.

The subject index is unusually complete, and forms a *précis* of the

book. The summary of facts (F) and theories (T) deducible from tracings at the end of the book will be especially useful to those who are not familiar with cardiographic work.

The book abounds in food for thought, and it will repay careful study. We have read it with pleasure, and cordially recommend it to students of cardiology as well as to the general reader.

A Campaign against Consumption. By A. RANSOME, M.D., F.R.S. Pp. x + 263, with charts and maps. Cambridge: The University Press.

THE author of this volume has been engaged in fighting against consumption for 55 years, and here republishes 22 of his papers relating to tuberculosis first printed elsewhere during the last 34 years. They are divided, according to their contents, into four sections. The first of these gives a general account of the causes and prevention of consumption. The second section is devoted to the conditions of infection in phthisis. The third contains seven researches on the tubercle bacillus and the treatment of phthisis. The fourth deals mainly with the statistics of phthisis. The importance of Dr. Ransome's steady campaign against tuberculosis has not, perhaps, always met with the recognition it has deserved. Perusal of the essays contained in this collection will show that he has always appreciated the proper strategy required for the successful conduct of such a campaign, and that he emphasized whole decades ago the importance of many of the discoveries or treatments in tuberculosis that a younger generation often fondly believes to be novel and its own.

A Practical Manual of Tuberculosis for Nurses. By L. L. BURRA, M.D. Oxon. Pp. 135. London: John Bale, Sons, and Danielsson. 2s. net.

THIS admirable little book represents a course of lectures delivered by the author to the nurses engaged in district work in the county of Bucks. It is divided into four sections, dealing respectively with a general consideration of tuberculosis, tuberculosis of the lungs, tuberculosis of other parts of the body, and the use of tuberculin in diagnosis and treatment. It is clearly written, and contains just the information a nurse requires; it would have gained in convenience had the publishers placed a Table of Contents on one of the three blank pages at its beginning. The book may be warmly commended to the attention of nurses, home visitors, and the like.

Consumption and its Cure by Physical Exercises. By F. SYLVAN, M.D. Pp. xx + 203, with 27 illustrations. London: Kegan Paul, Trench, Trübner and Co. 3s. 6d. net.

THE author of this book has written it for the lay public, to advertise the commonplace system of indoor gymnastic exercises by means of which he proposes to replace the modern treatment of consumption by sanatoria, open air, and vaccines. He gives an uncritical summary of the physiology of exercise culled from the literature, and writes unfavourably, but without comprehension, of the efforts of other physicians to treat phthisis. He is himself, he says, able to cure rheumatic fever by "vibrations." His exercises are of the usual type, and should be of real service to the sedentary

malade imaginaire. His book is a characteristic production of the so-called medical *Graeculus esuriens*, who comes to practise medicine in London for the benefit of—humanity!

Emergencies in Medical Practice: The Pathology and Treatment of Morbid Conditions that may suddenly endanger Life. By SANITAETS RAT DR. RICHARD LENZMANN. Translated from the third edition by Ronald E. S. Krohn, M.D. Lond. Pp. 577. London: John Bale, Sons, and Danielsson. 21s. net.

It is a difficult task at the present time to give an absolutely unbiassed judgement on anything emanating from Germany, but science, especially medical science, should be cosmopolitan, and we will therefore do our best to consider the book before us on its own merits.

A good idea of its scope may be obtained by enumerating the sections into which it is divided. The author discusses the morbid conditions which may suddenly endanger life in the following order:—Section I., those due to diseases of the brain and nervous system. Section II., those caused by diseases of the respiratory apparatus. Section III., those caused by diseases of the circulatory apparatus. Section IV., those caused by diseases of the digestive tract. Section V., those caused by diseases of the uro-genital system. Section VI., those caused by the abnormal course of pregnancy, labour and child-bed; and Section VII., those caused by poisoning. It will be seen from the above that the author takes a comprehensive view of his task, and yet there are some curious omissions. One would have thought that acute appendicitis should be classed among the emergencies in medical practice; it is, however, not mentioned in the index, and we can find no distinct reference to it in the text, though five lines are devoted to perforation of the appendix. That somewhat rare condition, acute suffocative œdema, also receives no mention. In the treatment of pulmonary œdema, the author omits all reference to the employment of atropine. We have found it most useful in these cases, and in the acute suffocative variety in the lung.

From the title of the book it might be imagined that only emergencies of a medical nature are treated, using medicine in its narrowest sense, but a considerable portion of the volume is devoted to surgical operations undertaken for the relief of conditions threatening life, and the very full section on obstetrical emergencies will render it especially useful to the general practitioner. The interest and the utility of the book is much increased by the inclusion of notes on cases illustrating points the author desires to emphasize. We can, therefore, warmly recommend the book as giving a fairly complete presentation of what should be done in cases of emergencies occurring in medical practice. We cannot conclude without congratulating the translator on the able manner in which he has performed his task.

An Index of Prognosis and End-results of Treatment. By various writers. Edited by A. RENDLE SHORT, M.D., F.R.C.S. Pp. 570. Bristol: John Wright and Sons, Ltd. 21s. net.

SOME two or three years ago we had the pleasure of reviewing the *Index of Differential Diagnosis* to which this volume comes as a fitting sequel. The Editor is quite justified in the statement he makes in the preface, that "this

volume is unique; nothing of similar character has appeared before or can compare with it." Its principal aims are as given in the preface:—

"(1) To set forth the results, and particularly the end-results, of various methods of treatment, in such a form as will enable the practitioner to obtain a fair, unbiassed, reasoned opinion as to the prospects of securing for his patient permanent relief, and the risks of such treatment.

"(2) To furnish data by means of which, apart from the question of treatment, one may seek to arrive at an accurate forecast of what will probably happen to the individual patient."

We have carefully tested the statements made by the Editor in the preface by referring to various sections of the book, and we find they entirely fulfil the requirements of anyone seeking to discover the risks incidental to any particular line of treatment, the complications which are likely to arise, and the prospects of complete recovery.

For an example we may take exophthalmic goitre. At the beginning of the article on this disease is given a table of the results of medical and surgical treatment. This table is then carefully analysed, and the writer sums up as follows first in respect of medical treatment: "There is no convincing evidence favouring any special drug treatment, and it would appear that of cases sufficiently ill to require hospital treatment or a special opinion, about one-half get well or almost well, 20 per cent. improve, about 10 per cent. do not improve and the mortality rate is about twice the normal." Of the X-ray treatment it is said that it compares favourably with other methods, but the figures are rather small. Under "Surgical Treatment" it is pointed out that this has made far more headway on the Continent and in America than in England, where it has been reserved for the worst, not to say totally unsuitable, type of cases. The various methods of operation are mentioned, and the immediate dangers of operation insisted on. If suitable cases are selected, it is shown that the present-day operative mortality is not above 10 per cent., and the Mayos have had a consecutive series of 278 cases without a death. The percentage of complete recovery varies with the different operators. Kocher claims that nearly half of his patients were completely cured.

If one looked for them carefully, doubtless omissions and faults would be found in the book, but we feel so grateful to the editor and his collaborators for the great pains they have taken in amassing such an amount of useful material, that we are in no mood for carping criticism. We would rather commend the book most warmly to physicians and surgeons and general practitioners alike, as a compendium of most valuable information.

The Clinical Anatomy of the Gastro-intestinal Tract. By T. WINGATE TODD, M.B., Ch.B., F.R.C.S. Pp. 264. Manchester: University Press. 6s. net.

THIS is a very useful work. It is essentially a compilation. The bibliography runs to 355 monographs, and this ample library has been richly drawn upon. In many pages each paragraph consists of facts culled from a series of these works. But while he has been careful to assign to each investigator the credit for the discoveries he has made, it is apparent that the author is a painstaking investigator himself, who has confirmed or refuted many of the observations of the numerous writers he

quotes. The work is confessedly not a text-book or compendium, one among many, but it is expressly designed to contain the most recent observations concerning the alimentary canal, particularly those having a clinical import, such as have not found their way into the text-books. The idea of the writer has been steadfastly carried out, and there is no painful reading of a padding of trite and well-known matter, but on almost every page even the expert will find something new and interesting. The teaching of the old anatomy books has required a complete remodelling, in the light of the information afforded by X-rays and opaque meals.

The teaching based on the interpretation of opaque meals has been founded chiefly upon material supplied to him by Barclay, one of the most painstaking and original of our radiologists and authors, and one can also detect the influence of Groedel. But the paragraphs on the movements of the stomach would be considerably improved, if they had included some of Barclay's observations of the movements seen in cases of gastric and duodenal ulcer. The work of Lane and Jordan arouses some criticism by the writer.

Some of the points of special interest are the new surface topography, the description of the diaphragm movements, the functions of the omentum, the equations of peritoneal and visceral pain, and its site of reference. The "lower gullet," the relations of embryological divisions to vascular supply, and the use of the terms "ventral" and "dorsal" are interesting to a zoologist.

The terseness of the style appears in some places to be too laconic, and a little expansion of the subject would make it more illuminating, but the author would probably reply that the needed expansion would be found in the monograph quoted. So if we read the 355 monographs, we shall be right!

There is much room for other works of this kind, in which classical and well-known facts are omitted, and only new matter introduced.

A Manual of Surgical Anatomy. By CHARLES R. WHITTAKER, F.R.C.S., F.R.S.E. Pp. 343. Edinburgh: E. and S. Livingstone. 6s. net.

THE second edition of this work is extended by about 100 pages, and contains several new illustrations by Mr. J. Grieve. In all books written on surgical anatomy extensive use of clear and simple diagrams is most essential. If the drawings be original so much the better; if they be in colour so much the clearer and more attractive. In the number of drawings the book is up to the average, though one would wish that even this number could be considerably increased. The actual technique and the colouration are uniformly good. The text is good, lucid, and makes easy reading. The bearing of the various anatomical details on the surgery or medicine of the area under discussion is shortly, though sufficiently, dwelt upon. The modern anatomy of the stomach and the intestinal canal, as based upon research by means of X-rays, is adequately described.

As a whole, the book is eminently justified of its second edition, and is certainly a most useful work for the student, whilst it is of the greatest use as a reference book to the busy operator.

THE PRACTITIONER.

DECEMBER, 1915.

TWO CLINICAL LECTURES ON SOME PITFALLS IN APPENDICITIS.*

BY D'ARCY POWER, F.R.C.S., LIEUT.-COLONEL, R.A.M.C.

Surgeon to St. Bartholomew's Hospital; Consulting Surgeon to the Bolingbroke Hospital and the Victoria Hospital for Children, etc.

LECTURE I.

I THOUGHT I would take, as my subject, some of the pitfalls of appendicitis; that is to say, pitfalls which you may meet with in cases of this disease. It would be impossible, I suppose, to mention them all. Whilst you are in hospital, you will see a few cases of appendicitis, and when in practice, you will see a case occasionally; hence, you may very soon come to the conclusion that you know all that there is to be known about it. Later on, as you get older and see more cases, especially if, as in the case of the staff here, you see sometimes five or six cases in twenty-four hours, and operate upon them, you will come to have greater and greater respect for the disease. You will find that what at first you thought was quite a straightforward disease, is really one of the most difficult and treacherous with which you will have to deal.

In the first place, no hard-and-fast rule can be laid down as regards either the diagnosis or the prognosis of appendicitis, and certainly not in reference to treatment. Every case differs from every other, and some—as I shall have occasion to show you—so widely that even the elect are constantly getting into trouble. We have no means, except those given by a very large experience, of distinguishing the different classes of cases. The instance, of which I shall now give you the details, forms a very good text, because it came under our own observation here not very long

* Delivered at St. Bartholomew's Hospital, October 1915.

ago. And if this occasionally happens in a large hospital, where we have abundant opportunities of seeing cases, it will certainly happen to yourselves in a much larger proportion of cases ; in other words, you are apt to be constantly deceived in connection with cases of appendicitis. You will make mistakes in the diagnosis of it, you will make mistakes in saying what is going to happen to the patient, and you will constantly be making mistakes in the treatment. You will, as I have said, have an increasing respect for appendicitis as you get older.

Let us consider the following. The patient was under the care of a most capable family practitioner, and was seen, as it happened, by three hospital surgeons, who, independently, arrived at the diagnosis of chronic intestinal obstruction, probably due to carcinoma of the large intestine. The *post-mortem* examination revealed no such cause, and showed that the patient died of the effects of gangrenous inflammation of the appendix. The patient was a married woman, æt. 56, who was admitted into hospital with the symptoms of intestinal obstruction, and with the history that for several months past she had suffered from increasing difficulty in getting her bowels open. She had experienced a severe pain in her abdomen two nights before her admission, and this was followed by vomiting and much abdominal distension, with inability to pass flatus. The bowels had been relieved once since the onset of the symptoms. The diagnosis of intestinal obstruction had been made without indication of the cause. The patient was seen by one of my surgical colleagues, and was ordered to be admitted into the hospital.

On admission, she came under my care, and it was then found that she had great distension of the abdomen, but it was nowhere tender or rigid, although some pain was felt in the region of the splenic flexure of the colon. The temperature was 99°·6 F., and the pulse 96. The rectum had lost its tone, and was greatly ballooned. No growth could be felt, and no blood appeared following the examination. The administration of an enema was not followed by any faecal discharge, but there was a passage of some flatus. I saw the patient, who did not seem specially ill, and confirmed the diagnosis of obstruction due to a new growth, which was, I

thought, probably in the splenic flexure, having assured myself that there was no local tenderness in the appendix region. Six hours later the patient suddenly became worse, the abdomen became more distended, and she began to vomit fæculent material. The temperature, which had fallen to 97° F. whilst she was in hospital, rose to 100°, and the pulse, which had been 84, became 116. A third surgeon then saw her, and decided to operate at once. On opening the abdomen, a brownish fluid, without fæcal odour, was evacuated, and much thickening was felt in the neighbourhood of the cæcum, which was thought to be due to the new growth. The peritoneum did not seem to be inflamed, and there was an entire absence of pus. An anastomosis was made between the ileum and the transverse colon. The patient died eight hours later, and the *post-mortem* showed complete gangrene of the appendix, the inflammation having extended as far as the cæcum.

That is about as misleading a case as you could well have, and had it not been for the fact that we were able to obtain an autopsy, it would have passed as a case of intestinal obstruction due to new growth.

I have tried, for your convenience, to classify some of these pitfalls in appendicitis and we will first speak of—

Pitfalls in diagnosis, which may be put down to faults—if faults they can be called—of the patient. The patient himself may have his general symptoms masked, or he may have his local symptoms masked. His general symptoms are very often masked by the fact that the first thing which happens to him is, that when he gets constipation and pain he says he has got stomach-ache; when he has stomach-ache he takes an aperient or purge, usually castor oil, or a pill, either jalap, colocynth, or calomel, something which acts pretty violently. If he does that, it is practically certain that he will get perforation of his appendix, for the peristalsis, as well as the congestion of the whole bowel, is thereby increased; and where the inflammation might have settled down if it had been left alone or an enema had been given, everything is now exaggerated, and the pain is made worse, so that either perforation occurs, or suppuration is precipitated. So the worst thing you can do or recommend

is giving an aperient, in cases in which you are doubtful whether the patient has got appendicitis or not. The symptoms are masked almost directly, or altered, by giving an aperient. Therefore, when you are called to a case of appendicitis, the best thing to tell the patient or his friends is not on any account to take or give an aperient, but to wait, and if the bowels are not opened, to administer an enema.

The symptoms may also be masked in another way. Instead of taking an aperient and causing diarrhoea and increasing the symptoms, a patient may, if he has had, as often happens, previous attacks, take a dose of opium. That is nearly as criminal as giving an aperient. I am afraid that you yourselves, when you get into general practice and are called to a patient who has bad stomach-ache, will give him opium, either as opium or as morphia, from what you are pleased to call humanitarian views. You will say, "He was in horrible pain, and we could not let him go on in that way, so I gave him a dose of opium." As surely as you do that, you take away the power of diagnosing what the condition really is. The pain is an indication that something is going very wrong, and because a patient is suffering pain you are not justified in giving opium to stop the pain before you have found out what is the matter with him.

Make your diagnosis first, as you ought to do in all cases of appendicitis; make your arrangements for operating, and then give him opium if you like. But do not give a patient opium and then send for somebody to come and tell you what is the matter with him, whilst you proffer the remark, "I have given him morphia, and he is quiet for the present." Yes, he is quiet, but in many such cases it is the quietness which ends in death. In such a case he is not seen in his original condition; his rigidity is now much less marked, and his pulse has been reduced in frequency. The temperature is not necessarily raised very much. His abdomen is moving fairly well, and the one who is called in in consultation will say, "He seems so much better, that I do not think he could have been as bad as you say; wait until to-morrow." That injunction may be forgotten, and the consultant is sent for in a week's time, when the patient is moribund. So you have killed that man, first because you gave him opium and so

masked the symptoms; and, secondly, because you did not attend to and act upon the advice which was given to you, to send again if he became worse, or remained in the same condition. You have waited so long that the time for operation has long since passed. So remember that opium, under these circumstances, is a distinctly bad thing to give.

It may seem not to be worth while pressing these points on you whilst you are here in hospital, but in many cases the patient will have taken an aperient for the pain, or you will find yourself tending in practice to give opium to lessen the patient's pain. Take it from us here, who have had a large experience, that an aperient and opium are the two worst things to give to a patient with assured or doubtful appendicitis. Bar them both, and open the bowels by means of an enema. Give no opium until, at all events, you have everything ready for immediate operation; at the worst, it means waiting for only a few hours.

Curiously enough, appendicitis can be masked by one or two other things. It may be masked by absolute inattention. That is not seen so much here as in country districts. The patient is, perhaps, a sturdy fellow, who has never been ill before, and does not feel the pain acutely. He will go on for two or three days before he thinks it is worth while to see a doctor; he does not want to make a fuss, and grudges the waste of time involved in seeking advice. Consequently, some of these patients delay seeing anybody, until they have developed a good-sized abscess. You must not trust, therefore, to the tale which the patient tells you. Make a physical examination and see whether there are the physical signs of appendicitis. If there are, it must be treated accordingly.

There is, however, a much worse condition than this, when the onset of gangrene has been so abrupt and speedy, that the patient feels little or no pain. The case which I took as the text of this lecture is an excellent instance. The patient was taken ill, and gangrene was set up at once; it spread rapidly, and all the tissues involved were killed; pain, consequently, was not a very marked feature. Still more remarkable, it was a condition of rapid gangrene in which there was no suppuration.

The absence of any definite history of pain may be due,

therefore, to one of two causes: the indifference of the patient, or the very rapid spread of gangrene. But remember, when you get gangrene like that, the local symptoms are, very often, almost absent; the abdomen may move quite freely, there may be no rigidity, there may not be any pain on pressure, and the temperature is not necessarily raised. The pulse, however, is always quicker. When the pulse is increased, there is a case for operating early. If there are symptoms of appendicitis and the pulse remains high, you must operate, whatever else happens. These are the cases with regard to which you are likely to get into more trouble than any others. I can recall one or two cases now, in which, because there were no marked symptoms, and because attention was not paid to the pulse, the patient was allowed to go on for a week or ten days, being meantime carefully watched with a masterly inactivity. Then came the sudden revelation that the abdomen was distending. Consequently, when an operation was performed, it revealed a gangrenous condition of the appendix; nothing could be done, and the patient died.

Another pitfall in these cases is due to the fact, that the patients seem so well, even with acute gangrene. They are alert, they answer questions readily, and will talk about themselves; and they will seem to you not to be ill, unless you have seen similar cases. If I go to a patient who is thought to have appendicitis, and find him with a quickened pulse, very alert, sleepless, and willing to talk about himself, I think very badly of him. I know that although there may be very few physical signs, and no suspicion of an abscess, yet those patients are very likely to die, whatever you do for them. The onset and progress of these cases is astonishingly rapid. We had one very miserable case, two or three years ago, in a young woman, *æt.* 25. She was playing tennis one Friday, and was taken ill that night, and was operated upon at midday on Saturday. She was found to have acute gangrene, which spread all over the wound, and soon involved the abdominal walls. On the Tuesday, she was dead. She never lost consciousness, and was talking up to within a minute or two of her death.

Therefore, put no trust whatever in the appearance or the

general condition of the patient, in these worst cases of sudden onset. You may ask, "How do you diagnose such a case?" That is another point; it comes from practice.

There are a few local symptoms by which you may be misled. First, there is the size of the patient; his fatness. It is extremely difficult, in a very fat patient, to feel local rigidity of muscles. It is impossible, in a person of 16 or 18 stone, to find out, owing to his layer of fat, whether the abdominal muscles are tense or not, whether the abdomen is moving fairly freely or not at all. In such a case, you must go by the other signs. You must make a rectal examination in all cases; you are apt to omit it. One hears from the doctor, "I did not make a rectal examination; I waited until you came." Why? "I did not like to." I repeat, it is necessary in all cases to make a rectal examination. You learn a great deal from it; you learn, for instance, the condition of the sphincter, which is a great guide; you learn whether the rectum is lax, or whether it comes down on to your finger, and whether the appendix comes straight down into the pelvis. In an obese patient, a rectal examination may help you much; it is the only means open to you of determining the condition and tone of the muscles.

Again, with regard to the patient, age is, I think, apt to be a pitfall. You think of appendicitis as occurring in young adults and in middle-aged people, and are apt to forget that it occurs at the extremes of life. You meet with it in old people of 80 and 85, and in children only a few months old. You have, therefore, no right to say, that the condition cannot be appendicitis because of the age of the patient. If the signs and symptoms are present, the patient has got appendicitis; it does not matter what the age is. Remember, too, it is an even more serious disease in children than it is in adults. Appendicitis in a child needs immediate operation. Over and over again the lives of little children are lost, because this has not been realized; you are apt to wait and see what occurs, as in the case of an adult. If you do wait, the time for operation has passed. Early operation, therefore, is even more essential in children than in the case of adults.

Now, as most of you will probably become general practitioners, it is important to consider what additional

pitfalls may exist.

In the first place, you are much too apt to rely on the history; to believe what the patient tells you, instead of examining him for yourself. You will ask him whether he has had other similar attacks before. If he has had only minor attacks, he will very likely answer "No." I am speaking now of the troublesome cases, those which mislead. In many cases, the patient will answer "Yes, I have had it before, but it is worse this time." We had an instance here only last week. The patient had an attack of appendicitis, and was very promptly operated upon. We made very careful enquiry; we said, "Are you sure you have had no previous attacks, as this seems rather a bad one?" "No," he said, "I have not had anything of the kind before." When we came to his appendix, we found it was tightly bound down right to the tip, and he had adhesions all over the cæcum. The appendix was only got out by stripping the submucous and mucous coats from the muscular layers; it practically had to be torn out of the adhesions. It is inconceivable that such a condition could have come to pass without the patient having had many previous attacks of inflammation, and if we had relied merely on the history of the case we should have been misled, because we might have waited a little if it had been the first attack. That is another fallacy. As a matter of fact, the first attack is, often, the worst. So make up your minds for yourselves in each case; do not trust to what the patient tells you and so become biassed.

Another thing—and this takes us back to what I have already told you—is that you may feel a disbelief in the severity of the attack; you do not realize that an attack is a bad one from the local symptoms. The local signs may be intensely bad, and yet the general appearance of the patient may not be bad; it may be so much otherwise, that you have considerable difficulty in convincing the friends that it is necessary to operate. These are perhaps the most disastrous cases of all; they will lose you more families from your practice than any others. You are called, perhaps, to one of these acute gangrenous cases, and because the symptoms do not seem to be very severe, you do not realize thoroughly how bad the case is. Hence, you probably do not watch the

pulse carefully, and her friends say that she has no pain, that she slept very well last night, and you find her ready to converse on indifferent subjects. They tell you it is true she cannot turn over in bed very comfortably, but who could with such a pain in the side? You agree to wait. In perhaps eight or ten hours, distension has begun, the pulse has increased in frequency, and peritonitis has come on; as certainly as possible that patient dies. Then the friends will turn round on you and say, "Why did you not insist on our having an operation done? You knew how bad she was, yet you only said, 'I think she should have something done.'" They entirely forget that they pointed out how well the patient looked, and that she had slept well and looked comfortable, and that though she had been a little sick she was quite cheerful. That will be remembered against you for months, the neighbours will talk about it, and members of the family will not come to you again. It happens in every one's practice; and, from your present standpoint, these are the most disastrous of all cases.

Here is such a tragedy. A doctor had an only child. He had been abroad 40 years, had just got his pension, and had come back to settle down and enjoy a cultured life with his wife and daughter. He had been doing abdominal work the whole of his life. His daughter was 22 years of age, and she had this condition of acute gangrenous appendicitis. He treated her for four days, and then got anxious about her, and sent for surgical advice, and we took out her appendix. She had gangrene of the appendix with perforation, and gangrene of the cæcum, and yet she had hardly suffered from any bad symptoms at all. After her death the father went abroad again, and took up his old work. There he stayed for the remainder of his life, a broken-hearted man. He could never forgive himself for not getting surgical help sooner.

These are really awful cases, and what I am trying to impress upon you is, that you must take the law into your own hands, if you have the least grounds for thinking it is one of these misleading cases of appendicitis. You must clear yourselves by saying emphatically to the friends "You *must* have an operation done." If, after that, they refuse, you

at least are clear of responsibility, and when the inevitable has happened, you might if you wished—though of course you would not do so—remind them that you strongly advised operation. Do not, in these cases, merely suggest, insist. The longer you are in practice, the more frequently will you take this line. At first, naturally, you will feel a little timid about making a firm stand, but you must tell the friends that cases of this kind, which have not been operated upon, have always ended disastrously. It is better that one or two operations should have been performed, which may not have been absolutely necessary, than that in these misleading bad cases, you should not have made your own position clear and unassailable. Watch specially the pulse. You will now better understand what I mean by disbelief in the severity of the attack.

Then there is the equally bad mistake, which I have already alluded to, of delay in making a diagnosis. The earlier you make the diagnosis in a case of appendicitis, the safer you are. It is not a disease with which to temporize. If operation is needed, the sooner it is done, the better. If you are not going to operate, come to that decision early too. Do not go trifling on, hoping that something better will happen on the following day. Such does not happen. What will happen is, that the patient will get worse; of that you may be sure, if it is a case needing operation.

As to what cases do need operation, that is a question with which we will deal next time.

LECTURE II.

IN my last lecture, I described various pitfalls met with in appendicitis, with reference to errors in diagnosis. I said that some were due to faults on the part of the patient, whilst for some the general practitioner was responsible.

I want now to go on to deal with the pitfalls from the surgical point of view. Many of you will have to operate on cases of appendicitis, because you yourselves must undertake these emergency operations in the country, where a regular operating surgeon cannot be obtained quickly. It is important, therefore, to realize how you may be situated. You have, first of all, to make a diagnosis. You will fall into errors

here, as I said, because you have not paid sufficient attention to the history of the patient's previous attacks, and did not think a patient could become ill so suddenly in a first attack ; nor did you imagine that the pathological conditions could have proceeded so far, because they had not declared themselves in the classical manner. From our point of view as surgeons, we have to go rather further in the differential diagnosis. You must think of the various conditions which you are liable to confuse with acute appendicitis. I am in the habit of thinking of the condition as connected with some perforation ; that is, a sudden attack of intense pain and collapse in a person who was previously healthy, or had suffered from indigestion. Is the pain in such a case due to a fulminating attack of appendicitis, or is it due to some other cause ?

The condition one thinks of is perforation, in connection either with the stomach or with the duodenum, perhaps most likely the latter. The question has been asked : How is it possible to confuse perforation of the duodenum with acute appendicitis, seeing that the two structures concerned are in widely different situations ? It is not likely, it is said, that the symptoms of the one will simulate those of the other. But, as a matter of fact, they do simulate each other very closely. If there is perforation of a duodenal ulcer, the contents trickle down at the back of the abdomen until they settle in the right or left iliac flank ; the pain, therefore, from which the patient is suffering is, as often as not, in the right iliac flank in duodenal ulceration, since he does not refer it to the upper part of his abdomen, which is the real source. Hence, one can understand the mistakes which are made between these two conditions. The converse error—mistaking appendicitis for duodenal ulcer—happens much less often. The method of distinction, however, is an easy one. The patient comes to you with symptoms of collapse, and you are in doubt whether he has a perforating duodenal ulcer, or acute appendicitis. He feels the pain on the right side, over the region of the appendix, but if it is duodenal perforation, the examination will reveal that the tender spot is higher up, above the umbilicus on the right side, that is, over the situation of the duodenum. When these conditions are confused, the fault lies in the omission to make a suffi-

ciently careful physical examination. You must make such an examination in all these cases, and supplement it by a rectal examination.

The next possible source of confusion is some other form of pelvic inflammation, and in the female the commonest, perhaps, is suppurative inflammation of the Fallopian tubes—salpingitis. In this, too, there may be sudden pain, localized tenderness, a rise in temperature, an increase in the pulse-rate, and the patient looks ill. It usually occurs in women who already have some vaginal discharge, and the abdominal examination will show that the patient's pain and tenderness are much less marked than in acute appendicitis. There is not the same amount of tension of the abdominal muscles in salpingitis, and the temperature is generally much higher. Remember that the abdominal tension and rigidity depend on the fact that the parietal peritoneum is inflamed; if that is not affected, there is not much abdominal tension. The ovaries lie much more deeply, and there is much less chance of the parietal peritoneum being inflamed; hence, there is less tension than in appendicitis.

Another misleading feature is, that the appendix may be lying vertically in the pelvis, and thus be brought into close relationship with the right ovary. In such cases, recurrent attacks of appendicitis may have been synchronous with the menstrual periods. In these cases, there is some absence of tension and rigidity; but, as I pointed out in my last lecture, you must not think, because the abdomen is not tense, and the rectus abdominis is not even slightly contracted, that, therefore, there is no appendicitis. In both cases, it is better to explore the abdomen at once. It does not matter whether there is pyosalpinx or appendicitis, because opening the abdomen will show which it is. I am considering the matter purely from the surgical aspect. With regard to salpingitis, I spoke in my first lecture about pitfalls, and we have just fallen into that very pit. Just before the Raid, a patient came in, who we concluded was suffering from pyosalpinx; during the Raid we cut down, and found she had a big gangrenous appendix. So even with full knowledge it is easy to make such a mistake. The patient was a woman, æt. 31, who was admitted on account of abdominal pain,

vomiting, and constipation. The pain had got worse one or two days before she came in. When we saw her, her temperature was 103° F. I thought that, with appendicitis, she ought not to have such a temperature as that after one or two days' illness; whereas in acute pelvic inflammation the temperature runs up as high as 104° .

A somewhat rarer condition, but one which you must bear in mind, is, that there may be a small renal calculus passing down the ureter, and lodging just about the brim of the pelvis. This causes many of the local symptoms of appendicitis; there is first vomiting, next obstruction, and then intense pain, which has come on suddenly, often without any indication from the character of the urine or from previous kidney trouble. Here again, a careful rectal examination, in conjunction with the general physical examination of the abdomen, will show you that you are not dealing with appendicitis.

Another condition to remember is ruptured extra-uterine gestation. A good-sized pelvic hæmatocele may occur suddenly, and has many of the symptoms of appendicitis. The blanching of the patient and her general aspect are wholly out of keeping with an attack of appendicitis, and should not mislead you. It is not very difficult to confuse these two conditions, because with the pain on the right side, the first condition to come to our minds is appendicitis, and we are apt to be biassed in its favour, because it is so much the more common. In this case, too, it does not matter very much, because operation will be necessary whichever it may be. But, remember, it is desirable to diagnose the condition before beginning the operation; do not wait for, and depend on, the operation for your diagnosis.

With regard to the chronic form of appendicitis, one condition to be remembered—and considerable stress has been laid on it recently by Mr. A. J. Walton in the October number of *The British Journal of Surgery*—is that known as visceroptosis, in which the whole large intestine sags down into the pelvis, and perhaps the stomach is displaced downwards as well. These cases are very likely to be mistaken for cases of appendicitis, and the removal of the appendix does not help the patient in the very least. Accordingly, if there

is a history of persistence of the symptoms for any length of time, without the intermissions common in appendicitis, and the patient has remained fairly healthy, remember this condition of visceroptosis. You can make the diagnosis by giving the patient a bismuth meal and then taking X-ray photographs of the abdominal contents at appropriate intervals. It is rather a disastrous thing for your reputation to promise to cure a patient by operating on her appendix, and then to find afterwards that she is still as bad as ever. Perhaps she goes to someone else, who, having been "let in" in the same way before, gives her a belt, and she no longer suffers discomfort from her visceroptosis. She at once says, she ought to have been ordered the belt and spared the operation. Impress on such a patient, before undertaking any operation, that it is thoroughly worth his or her while to have an X-ray examination, and to have a bismuth meal for that purpose.

With regard to the actual treatment of appendicitis from the surgical standpoint, I think that the two pitfalls into which you land yourselves most easily are, first of all, that you will delay operation, or advise the patient to wait, when he ought to be operated upon promptly. The other, and an almost equally bad one, is to advise immediate operation when the patient ought really to wait. These decisions depend upon two wholly distinct conditions. If you see a patient early, that is to say, in the first 24 hours, you ought to be able to diagnose appendicitis if he has got it. By all means give him a few more hours—12 hours perhaps—to see if delay brings improvement. This improvement will be shown by the pulse, more than by the temperature; it is more definite, if the tension and pain are lessened, and he is able to pass a little flatus. If, when you see the patient, you conclude that he is not improving, an operation should be performed, and it should certainly not be delayed beyond three days from the onset of symptoms.

All of us who have had much experience in appendicitis—and it applies not only in this country but all over the world—will tell you that we never regret having operated early; but often there is keen regret at having waited. Learn to depend on yourselves and on your own judgement; the earlier you make

your diagnosis, the safer it is for the patient. As soon as you have formed your opinion, watch carefully to see whether he is getting better, or whether his condition is stationary or becoming worse. In the latter case, operation without delay is the safest course, and, as I said before, delay is particularly dangerous in the case of children. I am equally emphatic in insisting that while you are waiting, you must not give opium or anything which may mask the symptoms; I would even exclude aspirin. Further, you must not yourself give, or allow to be given, an aperient.

But very many cases are not seen within those first few hours of the attack, of which we have been speaking. If you are in country practice, it will depend largely upon yourself how far you can prevail upon your patients to come and be seen early. I know that to this day there are large moorland tracts in Yorkshire, the inhabitants of which do not think of calling in or seeing a doctor until they have been ill three or four days; it does not appear to them to be worth while to bother him. In some cases of appendicitis, the symptoms by that time may have settled down somewhat, and a local abscess may have formed. In such cases, it becomes a more debatable point whether you should operate, or whether you should not. If the abscess is localized, or if the inflammation is chronic, I think you are justified in waiting for some length of time, unless the temperature begins to rise. But that is another type of case altogether.

When a patient has refrained from seeking advice until he has got a well-marked abscess, you are apt to cut into the abscess in order to try and get the appendix out; it is matted down by adhesions, and is very difficult to remove. In this effort there is much bleeding, and an infected hæmatoma, from which it is easy to get a general peritonitis, too often results. In such a case, if it is necessary to operate, because a rising pulse shows that the abscess is beginning to leak and infect the general peritoneal cavity, be content with opening and draining the abscess, and do nothing more. Let out the pus, wash out the abscess cavity with a very gentle stream of normal saline solution at a temperature of 105° F., and put in a very large drainage tube; in that way you will do much less harm than if you try to remove the

appendix, unless its removal would be very easy, as is the case when it is lying loose and has concretions in it. But do not waste time in looking for it.

The operation may be insufficient. You may have removed the appendix, but there is something more and worse present. Mr. Sampson Handley has recently been drawing attention to a very important series of cases, of which we see examples every now and then, perhaps once in two years. To these he has given the name "Ileus Duplex," and it is a condition which is often associated with a gangrenous appendix, though it may be associated with other forms of pelvic inflammation. I would refer you to Mr. Sampson Handley's graphic picture of the condition (*British Journal of Surgery*, October 1915, Fig. 68); the inflammation of the appendix is associated with an inflammation of the last two or three inches, or even a foot of the ileum. The latter has become so inflamed that it is paralysed. In these cases, it is absolutely useless merely to remove the appendix. Obstruction remains, and a short circuiting is needed to save the patient's life.

I remember the case of one poor girl, who died a few years ago, the nature of whose case is only shown in the light of this recent work. She was in Lucas ward, and I removed her gangrenous appendix and drained the wound. There seemed to be nothing further wrong, but try as we would it was impossible to get her bowels open. She went on for ten more days, and then began to get abdominal distension, and one day something suddenly gave way, and an enormous quantity of fæces was poured out. She died of shock. In the light of Mr. Sampson Handley's writings, we ought to have opened the abdomen again and short-circuited the lower part of the ileum, which we should certainly have seen to be inflamed and paralysed. The healthy part of the ileum would have been brought into connection with the ascending colon, and the bowel could have emptied itself, whilst the patient would have got better.

It is due to Mr. Sampson Handley's work that this condition has now become recognized. It is an important condition, and the practical bearing it has upon your work is, that if a case is not going on well, do not try and treat it by yourselves; either think out the cause, or send for a surgeon who has done the

operation, and let him be summoned as soon as you become dissatisfied with the patient's progress. Don't try to cure the case by giving purgatives, but have another operation done. It is better to do this than allow the patient to pass from bad to worse, and then die. You will have to be firm, because the friends are almost sure to say that another operation will be sure to kill the patient. You must put the case in the other way, and say that if another operation is not done, the patient is sure to die. If you read Mr. Sampson Handley's paper, you will see how the mortality from this condition has improved, since the condition he described has been recognized.

Another matter which comes up in connection with the operation is : Shall we drain this, or shall we not ? If you put in a drainage tube, it nearly always means that a sinus is left, and instead of the patient being in bed a fortnight, she will be in bed for seven or eight weeks. There is a disinclination to drain, therefore, unless it is absolutely necessary. Whether one may take the risk or not is one of the last things one learns from practice. I do not think anyone can teach it to you ; it can only come through dealing with a large succession of cases. What you have to decide is : Is there sufficient inflammation here to justify putting in a drainage tube ? If the appendix is gangrenous, you must put in a drainage tube ; if it is ruptured, you must drain, but where there is only a little pus or a slight purulent effusion each case has to be decided on its merits.

If you decide to drain, how will you do it ? It is not enough simply to put a drainage tube into the opening you have made ; you must make a counter-opening, well up at the back, just below the ribs, and use a big tube. Do not trust to a small tube and insufficient drainage, for a small tube is liable to become blocked. Put one tube vertically downwards into the pelvis, and another transversely through the thickness of the abdominal wall. Little by little these can be withdrawn. At the subsequent dressings remove the pus by sucking it out with a syringe, to the nozzle of which a piece of tubing is attached.

There are other things as well, which you will get into trouble about. There is a difficulty in finding the appendix. Very

often it may seem to you like a conjuring trick; you put in your finger, and out comes the appendix. But that readiness is acquired only as a result of a good deal of experience. When you come to operate, probably you will make your incision too high, or too low, or too near the middle line, and then you may pull out the transverse colon instead of the cæcum. You will know the cæcum because the ileum opens into it. If you get hold of the transverse colon, you will never succeed in finding the appendix; that is what you will do, if you do not pass your fingers down sufficiently deeply. You ought to recognize when you have got hold of the transverse colon, because it has appendices epiploicæ on it; so that if you find these, you will know that you are on the wrong track altogether. Put the bowel back and start again. It is sometimes very difficult to find the appendix. I do not try to operate through a small incision.

Unfortunately for the operator, the appendix is not always prominent. Within the last week, we have had one or two cases in which the appendix was absolutely concealed, and sometimes it hides itself in a curious way. It is always of a retiring disposition, and will lie flat against the back of the cæcum; it will cover itself over with membrane, which has to be dissected away before one can see where it is. The easy way to find it is from the end of the cæcum, tracing it from the proximal to the distal end. Again, the appendix may lie vertically downwards, and may have become firmly attached to the pelvic tissues. In such a case, you may have to dissect it out, which is a very troublesome affair, because the point of attachment, at the tip, is very apt to be torn away, if you get tired of dissecting and pull upon it too strongly. The piece you leave behind is liable to infect the surrounding tissues, and in a few days, or a week or two afterwards, there is a localized abscess. But if you patiently dissect it all away, this complication will be prevented.

One thing I am sure you will do, because we have all done it, is to take away a piece of omentum, and declare you have removed the appendix. In a fat subject, you may find a piece of omentum, shaped like an appendix, which you will tie off and remove, quite satisfied that the patient will do very

well ; but in a couple of months, or less, he will come back with another attack of appendicitis. Then you will have to allow, that some people must have more than one appendix. Really, it is a case of carelessness on your part, because what you removed had no lumen and no mucous membrane, only you never looked to see before the operation was completed. The knowledge that you are liable to these errors, will be your best safeguard against falling into them.



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By J. BLUMFELD, M.D.

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ALTHOUGH, perhaps, no branch of medicine has profited more from experiments on animals than the practice of anæsthesia, yet it is certainly true that in no instance is there more need for care in arguing directly from the laboratory dog to the clinically observed human being. An excellent example of the difficulty in deducing what is the truth, in the case of man, from what is physiologically true in the laboratory, may be noticed at the present time in articles that appear upon the subject of "light anæsthesia."¹ If the statements of some physiological workers were accepted, we should have to admit that the only danger from chloroform anæsthesia was the possibility of giving the drug in too slender quantities, that the only risk lay in a light degree of narcosis. Yet we know that there are thousands of persons operated upon during a light degree of narcosis, and that it is the lightness of the anæsthesia that, in many comparatively inexperienced hands, preserves the life of the patient. The laboratory worker who investigates the action of chloroform is at present, in some quarters at any rate, obsessed by the phenomenon of ventricular fibrillation, and because this is most readily produced in light narcosis, and is the most likely demonstrable cause of death in the laboratory, the phenomenon is called upon to explain all chloroform fatalities among human beings.

How cautious we should be before accepting this line of argument is very well shown by Embley,² who discusses the relationship between ventricular fibrillation and chloroform syncope. In the first place, there is the remarkable fact brought out by this observer, that it makes a great difference whether the animal experimented upon is a dog or a cat. Embley writes: "It is a circumstance of much significance that these experimental physiologists, who have worked with

dogs in the elucidation of clinical problems, should have reported no observations upon the occurrence of ventricular fibrillation. Neither is this owing to any experimental difficulties in eliciting the phenomenon nor of interpreting it when it happens, since it is readily recognizable and may be frequently observed in the laboratory when cats are used for experimentation under chloroform. I have found it to occur during the administration of chloroform to three out of five successive cats, whilst out of several hundred successive dogs, in which death has been caused designedly by chloroform under a great variety of conditions, I have never observed it, except as a terminal process when the blood pressure has fallen very low from shock or some other cause—a quite distinct event from that form of fatal syncope in cats.” It is obvious from the physiological work upon heart failure under chloroform, that two quite different explanations of clinical fatalities are offered, according as we argue from the dog or from the cat. Why should the human heart be regarded as analogous with one rather than with the other? Embley’s paper is soundly reasoned, and his conclusions are these:—

- (1) Syncope from cardio-vascular inhibition in dogs occurs only in the period of induction. This is the period incidence of clinical chloroform syncope. That of ventricular fibrillation in the cat may occur at any time in re-induction during a prolonged course of administration.
- (2) Cardio-vascular syncope from chloroform in the dog is frequently recovered from by artificial respiration, either alone or in conjunction with heart massage. This coincides with the recoveries from syncope in clinical instances. In my experience, established syncope from ventricular fibrillation in cats is not recovered from.
- (3) The control of the cardiac rhythm in the dog is markedly vagal, and approximates in that respect to that of man. In the cat, on the other hand, marked vagal control is not characteristic, and such control is readily inhibited. A heart under vagus control is not prone to ventricular fibrillation; hence, like that of the dog, the human heart should not be

liable to ventricular fibrillation.

- (4) Reflex syncope from cardio-vascular inhibition in dogs under chloroform anæsthesia occurs as readily as that in cats from ventricular fibrillation.
- (5) Syncopal states occur clinically either reflexly or from overdose, in which the heart does not stop, but the rate becomes very slow. This resembles similar states occurring in the chloroformed dog, which we promptly correct by vagotomy.

The practical outcome of the physiological work concerned seems to be that though, as has long been believed, the period of induction with chloroform is its greatest danger, yet we are not to assume, and ought not to teach, that therefore safety is only to be found in a deep degree of narcosis. A safer line of practice is, wherever possible, to avoid chloroform induction, and when this drug must be used *ab initio* to employ every device for the avoidance of possible cardio-vascular inhibition. Mental assurance of the patient, his proper position, the gradually increased supply of a weak vapour, and care for uninterrupted breathing are the essentials; to these may well be added the preliminary use of a small dose of atropine hypodermically. One of the difficulties with which the clinical worker is confronted, when he tries to learn from the physiologist, in the matter of chloroform administration is due to the frequent use by the latter of the term "light anæsthesia."

What is the physiologist's light anæsthesia? On reading accounts of some experiments, one concludes that often it is a state in the animal, which in the human being we could not reckon as anæsthesia at all, but only as a degree of narcosis on the road to anæsthesia. According to Cannon and Hoskins, sensory excitation, nervous excitement, and fear, are all able to stimulate secretion of adrenalin. This is an interesting observation in connection with Levy's work, showing the dangerous effects that are produced during light chloroform anæsthesia by the injection of adrenalin.

Shock.—If there is conflict of opinion among physiologists as to the mechanism of production of chloroform syncope, this is divine harmony in comparison with the divergence that reigns over the question of shock and its causation. Between

the two extremes of Crile, with his causation by nerve exhaustion, and Yandell Henderson, with his acapna explanation, there are innumerable degrees of adherence to the two views. Lately ³ further investigations appear to support neither of these two explanations of the phenomena of shock. A distinction is drawn between shock such as that produced by accidents, and the shock obtained in an anæsthetized animal. It is solely with the latter form that the author is concerned, and his experiments were all conducted upon animals during ether anæsthesia. The researches led to the following definite conclusions :—

- (1) "It is impossible to reduce the anæsthetized animal to a state of shock by any degree of sensory stimulation, provided all hæmorrhage is prevented and the abdomen is not opened." This controverts Crile's theory.
- (2) "He has been unable to show that acapna is a primary factor in the production of shock." This is equally conclusive against Yandell Henderson.
- (3) Shock is not due to disturbance of the respiration, though it is true that the respiratory centre is more quickly injured than any other vital centre by shock.
- (4) The vasomotor centre is not fatigued nor depressed in shock (this is directly contrary to Crile's conclusions); it is the most resistant of all the vital centres. The peripheral and undamaged visceral arteries are constricted in shock.
- (5) Shock is not due to primary failure of the heart, nor to involvement of the cardio-inhibitory or cardio-accelerator mechanism.
- (6) It is possible to produce the signs of shock by the use of excessive heat or cold.
- (7) The easiest and most certain method of producing shock is by exposure and trauma of the abdominal viscera.
- (8) Shock thus produced is not due alone to a paralysis of the vasomotor mechanism of the splanchnic area; for section of the cord or of the splanchnic nerves

does not produce shock, and when all the abdominal and thoracic organs are taken from an animal, this "visceral organism" can still be kept alive for many hours, can digest food, excrete urine, etc. Therefore, some other cause than vasomotor paralysis or inhibition is involved.

- (9) The cause of shock is the tremendous loss of red cells and fluid from the blood, due to the reaction of the splanchnic area to irritation — an acute inflammation of the peritoneum due to trauma, exposure to the air, and changes of temperature. The great amount of this loss is apparent, when it is taken into consideration that the peritoneum has an extent as great as the entire cutaneous surface of the body. The factors involved in this reaction to irritation are the same as those involved in any other local inflammatory process, and certainly do not involve the nervous system to any greater extent. The profound general effect is due to the actual loss of red cells and fluid through stasis, diapedesis, exudate, and endothelial changes. . . . In the course of operations in which the abdomen has not been opened, a loss of fluid and cells from the blood occurs. But the loss is, except when great areas of subcutaneous tissue have been exposed, comparatively unimportant.
- (10) Certain accessory factors which help to produce the condition of shock should be mentioned. These are muscular relaxation, decrease of intra-abdominal pressure, and impaired respiration, all of which tend to decrease the amount of blood returning to the heart. The effect of chilling and the use of hot applications should be considered.
- (11) Degenerative changes in the cells of the nervous system are the result and not the cause of shock. Identical changes are produced in the nerve cells by hæmorrhage.
- (12) General anæsthesia of moderate depth prevents painful impulses from affecting the nerve cells of the central nervous system. Nerve-blocking under

such conditions is useless, so far as the prevention of shock is concerned.

- (13) A relatively slight decrease in blood-supply may be sufficient to depress markedly the cells of the cerebral cortex. Care should be taken to exclude this factor before ascribing such depression to inhibition.

Lastly, Dr. F. C. Mann, whose conclusions we have given in such detail because they are, if true, so destructive of several widely held opinions, declares that the word shock should not be used, but an accurate and detailed description of the patient's condition always given instead. If the term be used at all, he thinks it should be applied to that condition in which, without any grossly discernible hæmorrhage having occurred, the amount of circulatory fluid is greatly diminished on account of stagnation of the blood in the smaller veins and capillaries, or by exudation of the fluid and cellular elements of the blood from these.

The bearing of the above conclusions, if they are supported, is obvious upon the value of the *anoci-association* method of anæsthesia, at any rate, so far as this is designed to prevent shock. The last is not, it must be remembered, Crile's sole object, that includes as well the prevention of after-pain from operation. His method has received the benevolent testimony of several writers during the past year (⁵ and ⁶), and the field for its especial value is becoming defined. It appears to be nowhere more valuable than in cases of goitre, for which its author also held it in particular regard, whereas for operations such as that of Wertheim, it cannot be thoroughly applied, and gives but disappointing results.

The specialization of even such a comparatively defined branch of practice as anæsthetics proceeds apace, and many writers during the past year deal with the special application of certain methods to certain particular operations. Page⁷ gives his experiences of spinal anæsthesia for suprapubic prostatectomy, and finds the method admirable. The risk of supervention of suppression of urine is smaller than after general anæsthesia, and shock, he believes, is much more efficiently prevented. This anæsthetist, in fact, states that, in his experience, general anæsthesia for prostatectomy does not

prevent shock ; a conclusion with which we do not think most anæsthetists will find themselves in agreement. There is much to be said for the combined use of general and spinal anæsthesia in these cases, and of this method Page availed himself in some of the cases upon which his paper is based. Great age, vascular degeneration, low specific gravity of urine, emphysema, and bronchitis were some of the reasons for which spinal anæsthesia was preferred in this series of cases. There were 41 complete recoveries out of 43 cases, and the two deaths cannot, as readers of the paper will see, fairly be put to the discredit of the anæsthetic method employed. Articles upon the most appropriate anæsthetic in dental cases⁸ and in operations upon the eye⁹ have also appeared, but we do not find in them anything to comment upon as being novel or an extension of well recognized principles and practice in the matter.

Reverting to the question of anæsthesia in prostatectomy, it is interesting to compare with the article above quoted the remarks of two American anæsthetists.¹⁰ One has a leaning towards local analgesia, and, if this is not applicable, thinks that spinal analgesia or else paravertebral or parasacral analgesia should be used ; the other arrives at the following conclusions with regard to major operations in gastro-urinary surgery, viz., that nitrous oxide and oxygen, preceded by proper preliminary examination, should be more frequently employed. He does not even mention spinal or local analgesia in connection with these cases, but says, "prostatic cases should all have the benefit of the preliminary treatment outlined by Crile and Buetler." This writer's opinions on the choice of anæsthetics generally offer many points of interest to a British reader, presenting, as they do, such marked differences from those commonly accepted in this country. For example, these two aphorisms :—

"Chloroform throughout is the anæsthetic of choice for chronic alcoholics in fair condition."

"Oil-ether colonic anæsthesia is indicated for the very obese."

There are, in some of the American literature under review,¹¹ suggestions that the swing of the pendulum has

come into play with regard to "open ether" in the very country which we regard as its birthplace. There is no doubt, that in the general enthusiasm for open ether the advantages that may be attained from a certain amount of rebreathing have been lost sight of. At the same time, the writer to whom we now refer, made no mention of one great objection to rebreathing, and the use of closed methods generally, viz., the difficulty of ensuring real cleanliness of the bags employed. It may be that in the case of ether, the bactericidal properties of the vapour are in themselves enough to ensure against the risk of infection. Some of the advocates of rebreathing attribute vomiting, intestinal paresis, and pains following the taking of open ether, to acapna, yet it is generally admitted that these symptoms were less frequent after the open, than after the closed methods of administration. Probably the best course is often one which allows the processes to alternate in a long case.

The condition of "twilight sleep" brought about by morphia and scopolamine, which is a state of analgesia very valuable in obstetrics, is in danger of being ruined in the eyes of medical men who have not tried it, owing to the exploitation of the method by sensational articles in the lay press. As a matter of fact, which obstetricians know and demonstrate by their practice, provided that the practitioner can spare the very large amount of time required to employ the method with success, there are great advantages to be gained by the use of scopolamine and morphia, particularly in the case of nervous primiparæ. A useful article on the subject with full bibliography is supplied by Addison Brenzier.¹² The writer points out the necessity for neglecting the earlier results obtained, owing to the frequency of decomposition of the scopolamine then used; he lays stress as well on the necessity for carefully controlling the morphia element, for lack of which damage easily accrues to the infant. "Unless continued observation of the patient in twilight sleep is carried out by someone accustomed to the technique, it is better not to attempt the method at all," is the opinion of another writer on this subject.¹³

Legal.—The question does not often arise in this country as to the legality of administration of anæsthetics by a nurse.

In America, it is in some States a burning topic, and very rightly a definite pronouncement of the law is asked for. In an article on "non-medical anæsthetists and the law,"¹⁴ the writer states that a lawyer has held that "a nurse can lawfully administer any anæsthetic in the absence of a physician, if instructed by him to do so." It is not surprising that he appeals to the legislature of the State to make it plain that the administration of an anæsthetic constitutes the practice of medicine, and cannot legally be delegated except under certain urgent circumstances.

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VENEREAL DISEASES AS WE SEE THEM TO-DAY.

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THE first thing which strikes me, on taking a general survey of things venereal, is the seeming enormous increase of cases. I say seeming, because it is impossible to prove that the increase is real, however firmly one may be convinced of its reality. It is the irony of fate, that this war should have begun before searching tests could be applied to the various schemes being worked out for the purpose of preventing venereal diseases. So long as the war lasts, not much more can be done in the way of prevention than can be done by lectures. There is no doubt that venereal diseases seriously affect the health of an army, rendering each infected man incapable of performing his military duties for a varying period. I hear, on good authority, that statistics have shown that in the German army, in which there has been an unprecedented increase of venereal cases, the period of incapacity per head is a month. In the British army, the period of incapacity must be very much longer than a month, for insufficient accommodation exists for venereal cases, and the treatment of them is, in the large percentage, negligible. Added to this is the fear of punishment and perhaps dismissal, that those infected dread.

My own impression is, that venereal cases are steadily on the increase, and I think that the military authorities would be well advised to take the matter into more serious consideration. It would be interesting to compare the average time for which a man is rendered incapable of performing his military duties, by wounds or by infection with typhoid and other diseases common in war time, with the average period of incapacity due to infection with venereal disease.

There are not, I think, sufficient special military hospitals, and, generally speaking, the men are not getting the best

treatment—*i.e.*, the treatment which is going to make them fit for duty again in the minimum time. Still more important is the fact, that all those in command have not yet learned to look upon syphilis and gonorrhœa as diseases. An enormous amount of good could be done in this country, if the halo of secrecy and mystery, which surrounds venereal diseases, could be done away with. Since the outbreak of war, so many cherished ideals have been cast away without a moment's hesitation, that I think no one would turn a hair if prudishness likewise vanished. There is no time like the present for making alterations, for the people are in a melting pot, to be turned out as the moulders will.

It is to be hoped, that there will be some moulding of the medical profession, so that, after the war is over, we shall not be turning back again to Germany, or to some other nation. One of the main reasons why we look up to foreigners, is to prevent any Englishman from getting any credit for his work, so deep-rooted is the individual jealousy between the members of our profession. If the study and science of medicine were organized in this country, as all our other industries are being organized, we could in time beat Germany, and be the leaders ourselves. Much might be done by a free discussion in the medical papers of the future of medicine from the national standpoint, and it would be extremely interesting to find out why France has had to give up the palm in medical science to Austro-Germany during the last decade.

To return to our subject: when the war began, and it became clear that our stock of salvarsan and neosalvarsan would soon give out, I did what I could to fathom the mysteries of chemotherapy, with the result that some most interesting facts were brought to light. I am unable to give them all here in detail, but some are mentioned in my new book, "The Biology and Treatment of Venereal Diseases," and others will form the subject for my Hunterian lectures next year. Anyhow, it can be stated here, that Ehrlich's discovery of "606" was due more to exhaustive good work than to sound reasoning; it would never have occurred, if he had not practised extraordinary patience and perseverance in trying one compound after another, until one was discovered which appeared

to fulfil his expectations.

An inquiry into the preparation and properties of salvarsan and neosalvarsan leads one to give particular consideration to several points. First, the compound from which "606" and "914" are prepared was synthetized and isolated by Béchamp, a Frenchman, in 1863. Béchamp's work was repeated by Berthelm and Ehrlich, who showed that Béchamp was mistaken in his orientation of the compound, for he thought it was a meta-body, whereas they proved that the groups occupy the para-position. The credit due for this correction is very small compared with that due for the actual synthesis, but no credit whatever is given to the French chemist.

Secondly, Meister, Lucius, and Brüning are dye manufacturers. The manufacture of dyestuffs is largely a secret, and the published patents are not calculated to throw light on the process. Dyestuffs are very often blended, just as teas are blended, and this blending is one of the most valuable secrets of the industry. At the outbreak of war, Meister, Lucius, and Brüning were employing more than 300 trained chemists, so they would be able to exploit every trick of the trade.

Thirdly, with regard to "914," sodium hyposulphite is largely used in the dye industry, but it cannot be used as a discharge in cotton printing, for it is oxidized on steaming. This difficulty was avoided by using formaldehyde sulphoxalate, first used at the Zündel works in Moscow. Neosalvarsan is "606" treated with this sulphoxalate, which gives increased solubility and reducing power.

We therefore see that "606" was largely derived from a French, and "914" from a Russian source, though no acknowledgment is made by the Germans.

The most outstanding feature of chemotherapy, as it applies to syphilis, is that the action of salvarsan is purely accidental, and I cannot help thinking that, before many months have passed, we shall have a drug or drugs equally as efficacious as salvarsan, and drugs which anyone will be able to use without risk. In fact, as I correct these proofs my anticipations have been more than realized. It is now well known that German chemical patents were drawn up with the deliberate intention of deceiving, and none more so than those dealing

with the manufacture of salvarsan and neosalvarsan, as I have found out to my cost. Surely, the acceptance of such a specification for the manufacture of chemicals for exclusive medical use is contrary to Patent Law.

A medical man holds the copyright of any book he writes, and I cannot see why he should not hold the rights appertaining to the manufacture of any drug he discovers, or at least receive some kind of remuneration for his efforts. Ehrlich was much abused, especially in this country, for the manner in which salvarsan and neosalvarsan were launched, but, oddly enough, those who most abused him were the first to approve of the patents being temporarily handed over to one English firm, which was never called upon to disclose its method of manufacturing the drug. I doubt if it is known for certain in this country, whether Ehrlich profited or not by his discovery; anyhow, the reader will be interested to learn that it costs 12 marks to make a kilo of "606" and that it sells at 16,000 marks a kilo. Soon after the war, the two chief weekly medical journals contained a long communication, and later a shorter one, from the National Medical Research Committee, to the effect that an English firm was able to prepare substances which were chemically identical with, and just as good as, any of the German products previously made.

As regards the first of these statements, because the English drugs had the same chemical formulæ as those given for the German drugs, it does not follow that the two are chemically the same. At all events, no one outside Hoechst knows how salvarsan and neosalvarsan are prepared. Clinical experience soon showed that the English products were not as good as the German products, and that they were dangerous to use. Soon after neokharsivan—the substitute for neosalvarsan—was put upon the market, owing to its highly toxic nature, its supply was stopped, and we have been without an actual substitute for neosalvarsan for months. This is the case, in spite of the National Medical Research Committee's statements, that the drug was as good as any German product previously sold, and that it had passed all the biological tests to which it had been submitted.

It is futile to rely upon biological tests to tell whether a drug is safe for wholesale use on human beings. Biological

tests are only of value in so far as they give an indication as to whether it is safe to try the drug on a human being. If Ehrlich had studied the human body, and had not drawn all his conclusions from his animal experiments, and from what he noticed in test tubes, he would never have made the mistakes he did make. Even Ehrlich, who was not a clinician, went so far as to get clinicians to use salvarsan and neosalvarsan on a few selected cases, before they were allowed to be used on a large scale. Frequent applications to the Board of Trade, to add neosalvarsan to the list of drugs which were permitted to come into this country from Germany, never met with success, in spite of the fact that the Board of Trade once admitted that neokharsivan had not passed the biological controls—a statement exactly opposite to that coming from the National Medical Research Committee.

In times like these, one does not want to find fault unnecessarily with any committee, for no one wishes more keenly than myself that Great Britain should take the first place in the world for medicine; but, unless important moves are to be made now, they never will be made. Good and important as the work which the National Medical Research Committee has already done, it does seem to me a pity that they should have handed over the manufacture of the substitute for salvarsan to a commercial firm, and not to one or more medical men. If it had been handed over to medical men, and if success had come to their efforts, it would have raised medical prestige enormously in this country. The result so far is, that British medicine has gained nothing and the commercial firm have failed in their endeavours.

To my mind, the soundest plan to have adopted would have been, first of all, to unravel the mysteries of chemotherapy, and to have discovered why salvarsan and neosalvarsan have such a marked antisymphilitic action, and then to have set to work to prepare other drugs having a similar action, the manufacture of which would not infringe the German patents. If success had crowned these efforts, there would be no apprehension as to what will happen when the war is over.

Summing up the matter, I must say that, in my opinion, neither the English nor the French substitution products for the German salvarsan and neosalvarsan are safe for general use.

Owing to certain drug laws that obtain in France, and to the fact that French scientists are individually more able and imaginative than the German ones, we are not without an arsenical compound which, although not quite so potent as salvarsan and neosalvarsan, is perfectly safe to use. I refer to galyl.

Galyl, which is, in my opinion, the safest arsenical compound to use in place of salvarsan and neosalvarsan, is, as can be seen from its formula alone, not quite so potent as the drugs just mentioned, and it is slightly more toxic. Not so many injections of galyl can be given as of neosalvarsan, and it is necessary to allow a greater interval between the injections. I have found the drug to be less toxic if injected well diluted, and not in the concentrated form which has been advised. Experience has taught me not to give more than six consecutive injections, and to allow *at least* a week to intervene between the injections after the fourth; otherwise, the risks of producing arsenical dermatitis are great. For the first four injections, I use doses of 30 cgr. each, and for the last two, doses of 40 cgr. each. Galyl can only be conveniently administered intravenously.

If galyl be used as the drug for the preparation of serum for intrathecal administration, the blood should not be withdrawn until about a week after the injection, for, owing to the slightly greater toxicity of the compound over neosalvarsan, and to the fact that galyl does not split up so readily as "914," the benefit accruing from the greater potency of serum withdrawn a few hours after the injection is more than counterbalanced by the harm done by its toxic action. Wilfred Harris, in a recent number of THE PRACTITIONER, says that he has obtained better results by using, for the intrathecal injections, serum which has been withdrawn seven to ten days after the intravenous injection of "606," instead of serum taken one to two hours afterwards, as advocated by Swift and Ellis. If neosalvarsan is the drug used for the intravenous injection, better results are obtained by adopting Swift and Ellis's procedure, except in actively progressing cases of degenerative myelitis, when Harris's variation is to be preferred. If the drug is more toxic than "914," it is better to use serum withdrawn one week after the intravenous injection

in all cases in which degeneration of nerve matter has occurred. In pure meningeal cases, it is better, in all cases, to adhere to Swift and Ellis's method, because the toxic effect is not sufficient to influence undamaged nerve tissue, and the maximum therapeutic action is required in the minimum time.

Having had considerable experience with intrathecal injections of salvarsanized serum, since my last year's article¹ was written, I am now more or less in a position to state in which cases it is useful and in which it is to be avoided.

In pure meningeal lesions, and in cases of meningo-encephalitis and meningo-myelitis in which there is no degeneration of nerve matter, intrathecal injections are strongly indicated, and they should be given as quickly as possible. Mercury and iodides, in spite of an apparent cure, should invariably be administered for one or two years afterwards.

In cases of degenerative encephalitis (G.P.I.), intrathecal injections are likely to do more harm than good. In cases of degenerative myelitis (tabes), intrathecal injections are sometimes indicated and sometimes contra-indicated. In slowly progressing cases, they are indicated; in rapidly progressing cases, they are contra-indicated. In quiescent and apparently cured cases, they are indicated only if the lightning pains are unbearable.

In pure arterial lesions, such as hemiplegia and transverse myelitis, there is no need to give intrathecal injections.

Concerning the leucocytozoon syphilidis and the Wassermann reaction, I have nothing more to add to what has appeared in my book. The same may be said of the condition, *ulcus molle*.

On the other hand, concerning gonorrhœa, I am glad to say that an advance has been made in our treatment, especially in the treatment of the acute stage. I refer to Russ's treatment of acute gonorrhœa by electrolysis. It is a pleasure to have to record, that what I think will be the most important discovery made in connection with one of the commonest diseases for many years, is the work of an Englishman. It has yet to be ascertained whether

¹ THE PRACTITIONER, December, 1914.

chronic cases of gonococcal urethritis can be cured by electrolysis, but for acute cases I can say that it is the best treatment we have at present. The patients I have seen treated, and those I have treated myself, have avoided all complications, such as epididymitis, etc., and in none has the process extended into the posterior part of the urethra.

The method is as follows: The patient presents himself with a full bladder, about half of the contents of which are passed on arrival. The patient then reclines on a couch, and a platinized catheter is passed as far as the compressor urethræ muscle. The catheter is perforated on its two sides, and a small rubber collar, which just enters the meatus, is fixed to the neck of the catheter, in order to keep in the urethra the solution which is to be injected. A platinum wire is passed down the catheter, and a 2 per cent. solution of sodium iodide, which passes through the perforations and bathes the mucous membrane. A lint-covered pad of flexible zinc (zinc chain) is wrung out in warm normal saline, and applied to the perineum, scrotum, and root of the penis. The pad is connected to the negative, and the platinum wire stylet to the positive pole. At half time, the poles are reversed. A current of one to two milliampères is passed for about 25 minutes altogether, during which time the catheter is kept full of the sodium iodide solution. After this, the patient empties his bladder, in order to wash away the *débris* which has collected in the urethra. Until the discharge has ceased, the treatment should be undertaken daily, and then every other day for three to six more sittings, or until the threads have vanished from the "morning" urine. One great point in favour of the treatment is that it is painless.

PROSTATIC OBSTRUCTION AND ITS SEQUELÆ.

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SENILE enlargement of the prostate, although an extremely common disease concerning which an enormous amount has been written, presents many points for further investigation. We are still in ignorance of the nature of this enlargement, and also of the exact manner in which the gland obstructs the overflow of urine from the bladder.

I do not propose to discuss either of these interesting points in this paper, but shall merely examine prostatic obstruction from its clinical aspect. I shall, therefore, endeavour to describe the course of a hypothetical uncomplicated case, and then show how it becomes altered by the advent of complications.

SYMPTOMS OF ENLARGEMENT OF THE PROSTATE.

In the earlier stages of its growth the prostate gives rise to no symptoms, and this latent period is, I believe, not only very long but also extremely variable. It depends on two factors. (1) The rate of growth of the gland. This is undoubtedly very slow, but we are ignorant of the conditions that govern it. (2) The fact that the onset of symptoms and the amount of urinary obstruction do not depend on the size of the gland but rather on its shape. Occasionally, one meets with cases in which a prostate, that is scarcely larger than normal, gives rise to complete retention, while one that is enormously enlarged only causes a slight amount of residual urine.

Generally patients are over 50 before they begin to suffer, it is rare to see cases between 45 and 50. Freyer¹ points out that the natives of India suffer from prostatic symptoms about ten years earlier than Europeans do.

The early symptoms of this disease are increased frequency

of micturition and alterations in the nature of the act.

The increased frequency of micturition is most noticeable during the night. Patients, who have been able to retain their urine all night, now find that they must rise several times to empty their bladder. They notice, however, that they can sleep comfortably for several hours during the earlier part of the night, but towards morning they may be disturbed as often as once an hour. This type of frequency is characteristic of the disease. Occasionally, patients find that they are troubled in the morning, and have to pass water several times while dressing. During the day, nothing is noticeable except that the urine cannot be retained quite as long as normally.

Turning to the act itself, the patient notices that there is a delay before the stream starts, that when it does start it is thin and weak, and that he has lost the power of projecting it away from him. On account of this, he may complain of the annoyance of splashing his shoes. The stream is diminished, and may be stopped entirely by any effort of straining, and not infrequently it dies away to nothing, but starts again after an interval of a few seconds. During the latter part of the act, it is always much feebler than during the earlier. In fact, the patient soon learns that his only chance is to wait and let the urine flow from him, regardless of how long the act may take. He may find, too, that micturition in the recumbent position is impossible; this in itself, however, must not be considered as a symptom of prostatic obstruction. If he consults a medical adviser at this stage of the disease, the latter will have no difficulty in passing a large catheter, and will probably draw off several ounces of residual urine, a condition that was quite unsuspected by the patient.

Supposing, however, that the patient does not seek advice, he will find that all his symptoms slowly but steadily increase in severity. The nocturnal frequency becomes more marked, and his sleep broken, or else nocturnal incontinence may be present. The diurnal frequency is also distinctly increased. The patient, as a rule, has no pain, but a dull suprapubic ache may be present, or a feeling of weight in the perineum complained of. In this stage, certain signs of impairment of the functional activity of the kidneys usually become noticeable. These are loss of flesh, increasing weakness, a

harsh dry skin and absence of perspiration, headache, thirst and dryness of the mouth and throat, loss of appetite, and aching pains in the loins.

In spite of these symptoms, the urine may be clear, acid, free from albumen, or at most it may contain the merest traces of it. However, there is generally polyuria, the total excretion of urine being raised to 60 or 70 ounces or even more. With this there is a decrease in the specific gravity, percentage of urea, chlorides, total solids, etc., but on account of the polyuria the total amount of urinary substances passed per diem may be almost normal. Such a patient will have a considerable amount of residual urine, from half a pint to a pint or more. If, however, the patient still does not seek advice, he will find that one of two things will happen to him. He will either get an attack of acute retention, or else he will find that the urine is constantly dribbling away and soaking his clothes. The former is the more usual alternative.

This attack has all the usual signs of acute retention, great pain, violent straining to pass water, and utter inability to do so. The patient has a constant and imperative desire to relieve himself, he tries to empty his bladder every few minutes, and every failure adds to his physical and mental distress. There is usually suprapubic dulness, but it is generally difficult to palpate the bladder, for the recti are held tense. It is wonderful how the pain and distress cease, as if by magic, as soon as the first ounce or so of urine escapes from the catheter. The treatment of this condition does not merely consist in passing a catheter and emptying the bladder. In all cases the patient should be put to bed, if possible before the instrument is passed.

If, however, he presents himself for treatment at the surgeon's house or consulting room, a catheter should be passed immediately, and 10 to 15 ounces of urine drawn off. He should then be sent home with orders to go to bed immediately, and to have a hot drink. As soon as convenient the catheter should be passed again, and the bladder emptied. The instrument ought to be tied in place, and the patient ordered from six to eight pints of warm fluids per diem; at the same time, hexamine or some other urinary antiseptic

should be administered. The patient should remain in bed for three or four days. At the end of this time the catheter may be removed, and the patient allowed to try if he can pass urine naturally. If the retention is due to congestion from cold or a wetting, from constipation, over-eating, or indulgence in alcohol, he will probably find that the power of micturition will have returned, but that he will have the old frequency and residual urine, and that sooner or later another attack of retention will ensue. If, however, there are no congestive symptoms, the retention may become permanent, and the patient will then enter on the stage of "catheter life."

The second alternative, distension with overflow, is a much more serious condition. The patient's frequency gradually increases until the urine continually dribbles away, and his one complaint is that he cannot hold his water. He may even go to an instrument maker to be fitted with a portable urinal. All this time he feels fairly well, but the clinical signs of impending renal failure are usually well marked. On examination, one finds a large tumour in the lower abdomen. It is globular, or may be shaped like a triangle with blunted angles and curved sides. In fact, it resembles very much a pregnant uterus at about the sixth month. The swelling is tense, sharply defined, and dull on percussion. Examination is easy as the tumour is painless, and the abdominal walls lax. Palpation may cause a desire to micturate. These patients always have clear urine, the specific gravity is rarely more than 1010 and may be much less, the total solids are diminished in amount, and a trace of albumen is frequently present. Polyuria is a marked symptom.

The natural instinct is to pass a catheter and empty the bladder, but this procedure is almost invariably fatal. If it is done, the patient may have an attack of hæmaturia followed by complete suppression, or else he may secrete a fair amount of urine with a specific gravity of about 1003 or 1004, and containing practically no solids. His tongue becomes dry and glazed, he suffers from great weakness and prostration, refuses all nourishment, and sinks into a dull apathetic half-comatose state, in which he dies about a week after instrumentation. There is yet a third factor that will certainly bring about a fatal issue, and

that is infection. These patients with over-distended bladders are very prone to it, and, as they seem to have lost all power of resistance to bacterial invasion, they very soon succumb. The day after catheterization, the urine is noticed to be slightly turbid. The temperature then begins to oscillate irregularly, and the patient falls into a drowsy stupid state. He may be slightly delirious, muttering, and plucking at the bed-clothes. His tongue is dry and covered with a dark brown fur. Polyuria is present till a few hours before the end, then the excretion ceases, and the temperature suddenly falls to sub-normal.

The correct treatment for chronic retention with over-distension is to empty the bladder very slowly. The patient should first of all be put to bed, and kept there during the entire course of the treatment; fluids, diuretics, and urinary antiseptics should be abundantly supplied. As to the actual emptying of the bladder, several courses are open. The finest procurable catheter (No. 3 or 4 French scale) may be passed and tied in, and the urine allowed to trickle away drop by drop. Another plan is to pass an ordinary catheter into which a tap has been fastened securely. The tap is turned on till the urine just escapes drop by drop. A third method is to tie in a catheter armed with either a spigot or a tap, and to draw off 2 or 3 ounces of urine every hour. The rationale of all these methods is the same, the bladder must be emptied, and the tension lowered slowly and gradually. It should take about three days to accomplish this. These patients never recover the power of voluntary micturition, so they must enter at once into catheter life, otherwise their bladders will again become over-distended.

THE EFFECT OF PROSTATIC OBSTRUCTION ON THE KIDNEYS.

As soon as the prostate grows large enough to cause any residual urine, a state which usually coincides with commencing difficulty in micturition, the intravesical pressure is slightly but continuously raised. The bladder being a muscular organ always exerts a certain pressure on its contents. Normally, this is nil when the bladder is empty, but it rises as the viscus becomes fuller and fuller, till it reaches a maximum at, or immediately before, the act of micturition. Now, if both

residual urine and a certain difficulty in expelling the vesical contents are present at the same time, it follows that even immediately after micturition the tension is plus (it can never fall to zero) and from this it rises more rapidly than normally to a maximum, which is higher than that found in unobstructed bladders. The net result is that the average intravesical pressure is raised during the whole course of the disease.

But, it may be argued, granted the intravesical pressure is raised, this can have no effect on the kidneys as long as the ureteric valves are efficient. This I deny absolutely. The ureteric valves prevent regurgitation of fluid from the bladder into the ureters, but they do not and cannot prevent a transmission upwards of the intravesical tension. The urine is forced into the bladder by the ureteric contractions, which act in exactly the same manner as the strokes of a pump when inflating a pneumatic tyre. The valve on the tyre corresponds to the ureteric valve. Air only enters the tyre when the pressure in the pump exceeds that in the inner tube, and, as the latter becomes inflated, the pressure in the pump must become greater and greater before more air is injected. Thus, the pressure in the higher urinary passages must increase with that in the bladder. As a matter of fact, one often finds the renal pelvis dilated long before the ureteric valves have become functionless.

This pressure is obviously injurious to the kidney, for it squeezes its secreting tissue up against the fibrous capsule. The effect of long continued pressure on any organ is to destroy its highly specialized portions, and to cause an apparent overgrowth of fibrous tissue. In the case under consideration the epithelium of the excretory tubules and of the glomeruli is destroyed, the cortex is thinned, the kidney is hollowed out and weighs less than normal. On section, the few remaining tubules appear strangled in fibrous tissue. This destruction of the renal elements is not a late phenomenon in the course of prostatic obstruction, it commences early and is slowly progressive, but it does not give rise to symptoms till the disease is far advanced. As we have more renal excretory tissue than is necessary for the ordinary needs of the body, the destruction of the surplus may not be noticed.

A patient in this condition is like a man living on his

capital. If this is sufficient to last his lifetime, well and good; but if not, things appear to go on quite smoothly until he suddenly becomes insolvent. This is the reason why this type of patient may become uræmic after an operation, an anæsthetic, or even catheterization, as well as why pneumonia or any other febrile disturbance is so fatal in prostatic cases.

The most advanced form of prostatic obstruction is chronic distention with overflow; consequently, in these cases the kidneys are most affected. The pressure on the renal pelvis has been raised for a long time, and as a result not only is the secreting tissue of the kidney reduced to a minimum, but the blood vessels have even lost their tone and are depending on the support of the urinary pressure. Now if a catheter is passed and the bladder emptied, this long-continued pressure is suddenly relieved, the toneless vessels of the kidney dilate and become engorged, and this dilatation may be sufficient to stop the circulation in the capillaries. The patient then has an attack of hæmaturia, which is followed by suppression of urine. The reason that we empty the chronically overdistended bladder so slowly is to allow the renal veins to recover their tone.

COMPLICATIONS OF PROSTATIC OBSTRUCTION.

Up to this, I have not mentioned a single complication of prostatic obstruction, I have merely outlined the course and progress of a hypothetical uncomplicated case. These are exceedingly uncommon, but for the sake of clearness I left out all the confusing symptoms produced by complications. Even in this exceptionally favourable case, the disease pursues a slow but steady course to its inevitably fatal end. The chief effect of complications is to hasten the course of the disease, and to introduce the element of pain.

Prostatic cases usually become infected by catheterization, and once they are infected I doubt if they ever completely recover. They may lose all symptoms due to infection, but the urine remains turbid and contains living organisms. I have never seen a patient on catheter life who was able to keep his bladder clean. They usually suffer from recurrent attacks of cystitis, epididymitis, or from the much more serious condition—chronic septic pyelonephritis. So to put a patient

on self-catheterization is, in my opinion, to expose him to all the dangers and difficulties of urinary infection.

Urinary sepsis varies in severity from an ascending infection, terminating in acute ascending pyelonephritis (surgical kidney), to a moderate degree of infection of the bladder. Supposing a patient becomes slightly infected, and this infection remains localized in his bladder, he finds that the type of his frequency is altered. He now can only hold his urine for a fixed period, irrespective of the time of the day, for example, he may have to pass it every hour both by day and night. He has pain usually felt above the pubes when the bladder is full, and the desire to micturate is imperative, that is, if it is not yielded to immediately some urine will pass involuntarily. Usually there is scalding along the urethra when the urine is flowing. Such a patient is very prone to acute painful retention, but never suffers from painless over-distension. Supposing, however, his kidneys become infected, and this is the rule after a longer or shorter interval, the signs of renal failure will quickly become manifest. A dull ache in the loins will be complained of, the tongue will become dry and coated with a dark brown fur, thirst and headaches will be present, and the patient will very soon become emaciated and suffer from great bodily weakness and prostration. The wasting is often so rapid and so marked that malignant disease is suspected.

Stone in the bladder was present in about 18 per cent. of Freyer's cases,² and the statistics of St. Peter's Hospital give approximately the same proportion. Several causes account for this surprising frequency. A small stone may descend from the kidney, and becomes trapped in a deep post-prostatic pouch. Again, if the bladder is infected, especially if the cystitis is alkaline, soft phosphatic calculi find almost ideal conditions for rapid growth. These phosphatic "dirt stones" form the majority of calculi found. In cases in which the prostate is definitely enlarged, calculi do not, as a rule, give rise to the characteristic symptoms of stone. Their presence is masked, and they give rise to surprisingly few symptoms. However, a stone should be suspected in every case in which pain is prominent and long continued. I think that vesical calculi occurring as a complication of enlargement of the prostate are a formal indication for prostatectomy. It is

almost impossible to crush the stone satisfactorily in these cases, and still more difficult to remove all the fragments, therefore an early recurrence is a rule. After prostatectomy the only stones that recur are the soft phosphatic concretions, and these only if the cystitis remains.

A large group of complications is directly due to catheterization; they are urethritis, epididymitis, false passage, peri-urethral abscess, traumatic hæmorrhage, etc. The most important type of false passage are those that occur in the prostatic urethra. They are usually situated just above the entrance of the ejaculatory ducts, where the posterior wall of the urethra inclines suddenly forwards. This change of direction is chiefly caused by the growth of the "middle lobe," which overhangs the upper part of the prostatic urethra. The catheter strikes this part of the urethral wall, and may tunnel through it, and even through the "middle lobe" of the prostate into the bladder. I saw one case in which this occurred, and a second where the middle lobe had been split in two by a vigorous attempt at catheterization. In this case prostatectomy had to be performed as an emergency operation to check the hæmorrhage. If catheterization is impossible on account of false passages, it is best to tap the bladder, and do a cystotomy as soon afterwards as is possible.

In addition to hæmorrhage due to trauma, prostatic cases often suffer from attacks of hæmorrhage from congestion. The bleeding may be so severe that the bladder becomes filled with clots. It is usually increased by straining, and ceases spontaneously if a catheter is passed and tied in. However, if blood-clots are present in the bladder, they must be washed out through a large-eyed catheter, or a litholapaxy cannula.

TREATMENT.

As in most other surgical conditions, the treatment of enlarged prostate is palliative or radical. The palliative treatment is self-catheterization, the radical prostatectomy. The only indication for palliative treatment now-a-days is the risk involved by radical measures, and the natural hesitation of patients to submit to an operation. Let us apply these considerations to the treatment of prostatic obstruction. First,

as to the relative mortality: if a patient enters on catheter life, he must continue it till he dies, and his death is nearly always due to, or accelerated by, complications caused by the treatment; therefore, the mortality may be set down at 100 per cent.

This, however, is manifestly an unfair method of comparison; so let us, as Watson suggests,³ compare the mortality during the first month of catheter life with that after prostatectomy. The convalescence after operation takes about a month, so in each case the interval is approximately of the same duration. Watson puts the mortality during the first month of catheter life at "a little less than 8 per cent.," and goes on to say that if the second month was included, "the death rate would be a good deal higher than 8 per cent." These figures were taken from a series of 207 cases under the care of Rosving, Casper, and himself. These three men being distinguished urologists, one would expect the mortality to be higher in less experienced hands.

Turning to the statistics of the mortality after prostatectomy, Freyer⁴ had 57 deaths after 1,036 operations, or a mortality of $5\frac{1}{2}$ per cent. The figures from St. Peter's Hospital give almost as good results. During the eight years (1907 to the end of 1914), 651 prostatectomies for benign enlargement of the gland were performed with 47 deaths, or a mortality of 7.2 per cent. Therefore, the mortality after operation, in the hands of experts, is less than that of the first month of catheter life. Secondly, look at the condition of the patients at the end of this period. Those that have been operated on are cured, while those that have tried palliative treatment are only entering on an existence of discomfort and danger, and one that practically debars them from taking part in the ordinary pursuits and pleasures of life. Another lesson to be learnt from these figures is, that to advise a patient to try self-catheterization first, and then if this fails to undergo the operation, is merely submitting him to the double risk. I feel strongly that palliative treatment should be reserved for those cases in which an operation is absolutely contra-indicated, and for those cases only. If a patient refuses operation, he must do so at his own risk.

This mortality is not excessive when one considers the

serious nature of the operation, the long convalescence after it, and the age and enfeebled state of the patients upon whom it is performed. Yet, in spite of these difficulties, I believe it can be reduced materially. From the date of Freyer's first prostatectomy to the end of 1914, 77 deaths occurred after this operation in St. Peter's Hospital. Forty-nine of these (63 per cent.) were due to renal failure, in 8 additional cases (10 per cent.) renal failure was associated with some other complication, *e.g.*, pneumonia, while only 18 deaths (26 per cent.) were from causes quite unconnected with the state of the kidneys. But, as we have seen that prostatic obstruction invariably causes a slow but steady destruction of the kidney substance, with a corresponding diminution of its value as an excretory organ, it follows that over 60 per cent. of the death-rate after prostatectomy is due to the fact that the operation was postponed till too late. If patients were systematically advised to undergo operation, as soon as definite signs of prostatic obstruction are discovered, I feel sure that the mortality would fall to about half its present rate. The responsibility rests with those who first see the patients, they too often remember the old teaching that catheterization should be postponed as long as possible, and apply this doctrine to operation. Operation is not an alternative to catheterization; it is a cure of the condition, and therefore should never be delayed.

Prostatectomy holds a position that is almost unique in surgery. It is regularly performed on patients in extreme old age, who are broken down by long periods of illness and want of sleep, and who very often are in a profoundly septic state. In short, no other major operation would be contemplated under like conditions. Therefore, its indications and contra-indications demand more than passing notice. Unfortunately, it is impossible to give more than the merest outline in this paper.

The indications for operation may be summed up in a word—every case of obstruction due to the senile enlarged prostate should be operated on. If this appears too drastic, one may make artificial rules for his own guidance. Personally, I believe that the following meet most requirements:—(1) All patients with two or more ounces of residual urine

should be operated on. (2) Patients with less than two ounces of residual urine should be operated on if (a) the other signs of prostatic obstruction are marked, or (b) if there have been attacks of retention. These suggestions presuppose that the diagnosis of the prostatic condition has been made without any possibility of doubt.

The contra-indications to this operation are not so numerous as one would expect at first sight, for many of the so-called contra-indications have little or no weight.

(1) *Extreme Old Age*.—This is not a contra-indication. I have operated on one nonagenarian, and assisted at the operation on two others. My case died of renal failure 48 hours later, both the others survived, one for several months, and the other is now alive and well, seven years after his operation. In 1912, Freyer⁵ reported that he had operated on 62 octogenarians. Other things being equal, the older the patient, the greater the shock, and when operating on these very old patients everything possible should be done to minimize it.

(2) *Cardio-vascular Disease*.—Fairly well compensated valvular disease is not a contra-indication. If a general anæsthetic is inadvisable, spinal anæsthesia may be used. Probably the most serious condition is a weak flabby heart without any obvious valvular lesion. Atheromatous or calcareous degeneration of the arteries, if at all extensive, undoubtedly increases the risks, chiefly owing to the complications it may give rise to.

(3) *Pulmonary Disease*.—Very severe chronic bronchitis may form an absolute contra-indication to operation. In less severe cases, it may be performed under spinal anæsthesia, provided the patient is kept sitting up in a warm, equable atmosphere. Of course, coughing causes a good deal of irritation so long as the drainage tube is in place, and also predisposes to hernia.

(4) *Renal Conditions*.—Chronic Bright's disease rarely is a complication, for patients suffering from this disease usually die before they reach the prostatic age. Advanced back-pressure, with or without urinary sepsis, forms one of the greatest difficulties one has to face when treating prostatic obstruction. If the patient shows any signs of uræmia, or if

the urinary excretion is deemed insufficient, the back-pressure should be relieved immediately by tying in a catheter, and the kidneys stimulated into activity by fluids and diuretics; at the same time, the food should contain as little nitrogenous matter as possible. If this does not bring about a rapid amelioration of the condition, the bladder must be opened and drained. This preliminary cystotomy should be considered as an emergency operation, it ought to be performed under local anæsthesia—to avoid the deleterious effect of a general anæsthetic on the kidneys—unnecessary manipulations are absolutely to be avoided, and shock must be minimized. As a general rule, the patient will have sufficiently improved in a fortnight to allow of the prostate being safely removed. This two-stage operation is undoubtedly of great value, for it enables patients to recover from the pernicious effects of the urinary obstruction before undergoing the serious part of the operation. However, it would rarely be needed, if early operation was the rule and not the exception.

CONCLUSIONS.

(1) Prostatic obstruction, if left to itself, invariably tends to shorten the patient's life.

(2) Chiefly on account of its complications, it renders his declining years miserable.

(3) Catheter life is a makeshift, and a dangerous one at that.

(4) Prostatectomy is the only certain cure.

(5) The mortality after prostatectomy is about 7 per cent., and over 60 per cent. of this is due to delay.

Therefore, I maintain, that whenever definite symptoms of prostatic obstruction are present, the question of early operation should be carefully considered.

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HÆMATURIA.*

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INTRODUCTION.

THE case, which is the subject of the following clinical demonstration, is not brought forward as being interesting or rare, or as involving abstruse questions of operation or other treatment. It is, apparently, a simple case of hæmaturia, associated, as shown by the patient's statements, with unilateral renal symptoms.

The chief part of the demonstration is directed towards an attempt to demonstrate :—

1. The cause of hæmaturia *during* an attack of hæmorrhage ;
2. The functional value of the two kidneys, with a view to the just consideration of the efficacy of an operation, or other treatment.

It is quite certain that many cases of hæmaturia are examined some time after the hæmorrhage has ceased. This is not as it should be ; an examination, thorough and methodical, must be carried out during an attack of hæmaturia. Moreover, the functional activity of both kidneys should be examined when unilateral symptoms are present, so that an operation upon one kidney may be performed or not, with a sure and certain knowledge of the condition of the other.

HÆMATURIA IS A SERIOUS SYMPTOM.

The occurrence of hæmaturia, even on a single occasion, is, in many cases, evidence of a serious lesion of the urinary tract, so that it is never justifiable for any one to omit complete investigation of the case with a view to an accurate diagnosis being made. It is true that, in a small minority of cases, the

* A clinical demonstration at Guy's Hospital.

cause of the hæmorrhage may be of little real importance ; but the fact, that such cases do occur, can never be regarded as an excuse for neglecting to take into account the extreme probability of the cause being due to a grave lesion.

It is possible that, in some cases, the exact significance of hæmaturia is overlooked. Although a man suffering from hæmorrhage, due to tuberculous disease of the lungs, may be in a serious state owing to the loss of blood, yet the significance of the hæmorrhage lies far deeper than this ; but it is possible that whilst hæmaturia is, as a rule, self-evident, its exact significance, unlike the hæmorrhage associated with phthisis, is overlooked. The analogy of both cases is evident, although the actual loss of blood is regarded as important, and not what the hæmorrhage really means. Death from the actual loss of blood is extremely rare in cases of hæmaturia ; death due to the cause of the hæmaturia is not uncommon.

A case of hæmaturia should never be treated symptomatically. Its cause should be discovered, and treatment should then be directed to remedying the lesion. Another rule in connection with a case of hæmaturia is this : a thorough examination should be made during the attack of hæmaturia, when the source of the bleeding, at any rate, if not the cause, can be defined more exactly, than if the examination be made after the hæmorrhage has ceased.

It may be repeated that hæmorrhage from the urinary tract is not, in itself, a serious factor in the progress of the disease, except in a few cases which are frequently very much benefited by the irrigation of the bladder, necessary for one part of our examination—the use of the cystoscope. Few indeed are the cases in which the patient is in such a bad condition as to preclude a thorough and methodical examination.

HISTORY OF THE CASE.

It will, therefore, be of advantage to consider the following case of a man, who is suffering from some condition giving rise to hæmaturia, and who is, at present, attending the Genito-Urinary Department at Guy's Hospital.

He has (October 23rd, 1915) brought up a bottle, containing urine mixed with blood, and it is at once obvious that the

amount of hæmorrhage is not of grave significance. The patient shows no signs of blanching, or even anæmia, such as patients suffering from the effects of hæmorrhage usually do. This point is urged now as an illustration of the introductory remarks prefacing this demonstration.

The case may be presented in detail thus: the patient first attended for examination at Guy's Hospital, on Wednesday, 20th October, 1915. As his urine showed no sign of blood in it, examination was deferred. On Friday, 22nd October, he passed blood in his urine, of which he has brought up a specimen, and it is now possible (Saturday, 23rd October) for an examination to be undertaken with a view, first, to defining the source of the bleeding, and secondly, to making a diagnosis.

PERSONAL HISTORY OF PATIENT.

The man is aged 45, and is of small build, but strong, and well covered with a normal amount of fat. He is somewhat sunken in the face, but has deficient and decayed teeth. His complexion is good, but inclined to sallowness. He gives the following history. He has been an able seaman in the Royal Navy, but was invalided out for "kidney disease" on the 20th of May, 1915, at which time he was serving, as a second class petty officer in the coastguard, "somewhere" in Northumberland. He has been in the coastguard about 15 years.

The patient gives the following medical history.

He suffered from gonorrhœa in 1890, and from syphilis in 1897; both of which diseases are said to have been cured. He has been in British Central Africa, and whilst resident there, in 1894, contracted malaria. He had 14 or 15 attacks out there, and has occasional shivering fits even now. He is married, but has no children, and his wife, according to his own account, has had no miscarriages. During the past six years, he has suffered from asthma, but he volunteers the statement, that this was nearly cured during his sojourn in Northumberland.

FAMILY HISTORY.

A sister of the patient is in a sanatorium, suffering from

tuberculosis of the lungs.

HISTORY OF DISEASE.

The patient has had pain in the back of the left loin, which began in July, 1914. The pain has generally been of a neuralgic character, with subacute exacerbations. Not infrequently, it has radiated towards, and into, the left inguinal region, and involved the left testicle. The pain became very bad on the night of March 7th, 1915, and hæmorrhage occurred, blood being passed with the water. The passage of the blood relieved the pain. During the attack of hæmaturia, he did not vomit and had no rigors, with which he is quite familiar, having suffered from malaria. This attack of hæmaturia continued for two days, gradually disappearing. The patient has never noticed clots of blood in his urine. The occurrence of hæmaturia was not repeated until the end of September, 1915, when there was another attack, which lasted only for a day. He thinks that between the attacks of hæmaturia and after its occurrence there has been "pus in the water."

Last night (October 22nd, 1915), he again had an exacerbation of pain, and again passed blood in the urine. He has brought up a specimen, and this will be examined. This morning (October 23rd), the patient's urine contains no obvious blood, but there is undoubtedly pus in it.

GENERAL EXAMINATION OF THE PATIENT.

A thorough and immediate examination is indicated. The patient says he has pain over the back of the left loin, immediately above the left buttock. The pain does not radiate, and is not associated with any tender cutaneous spot. The kidneys are not palpable; but the descending colon and sigmoid can easily be palpated, and are clearly full of fæces. There is a distinct degree of hypospadias present, with the opening of the urethra on the ventral aspect of the gland near the corona, and separated by a distinct interval from the true "meatus urinarus," which is merely a deep pit.

This condition of hypospadias is important for two reasons. First, the introduction of the cystoscope may be difficult, for the opening of the urethra in such cases is small, and, frequently, not capable of being even moderately stretched; secondly

congenital faults in the lower urinary tract are sometimes associated with faults in the upper urinary tract, such as a horseshoe or single kidney, and therefore it will be necessary to examine both kidneys and prove their separate existence.

Fortunately, there is no difficulty encountered in the introduction of a large *coudé* catheter, and irrigation of the bladder, with the help of the special apparatus used in the Genito-Urinary Department at Guy's Hospital, is performed. The advantage of this apparatus is, that the bladder and urethra are subjected to a minimum of disturbance, and the parts around the patient are kept perfectly dry. The urine drawn off amounts to five ounces. It contains pus, and is generally opaque. The opacity may be due to micro-organisms, for it has no tendency to settle like the pus. There is one small clot of blood in the urine, but otherwise there is no sign of hæmorrhage.

CYSTOSCOPIC EXAMINATION OF URINARY TRACT.

The examining cystoscope, after withdrawal of the catheter, is passed easily, and the following facts are capable of being demonstrated, the bladder holding 6 ounces of fluid. The prostate gland is distinctly, but not greatly, enlarged into the bladder, but the ureteric orifices can be seen quite easily. The bladder wall is distinctly fasciculated, but the mucous membrane is healthy, as well as the submucous vessels.

Both ureteric orifices are larger than usual, the right only slightly, the left rather more than slightly. Both show evidence of movement just before the passage of the renal secretion through them. The mucosa around the left ureteric orifice is injected, and the fluid which comes from it is opaque and distinctly visible.

The right ureteric orifice is also injected slightly, but the fluid which is passed from the right ureter is not visible, except that it produces disturbance in the bladder fluid, and the currents thus set up can be distinctly seen.

Beneath the left ureter a spiral clot of blood can be seen, the calibre of which exactly corresponds to the size of the left ureteric orifice; moreover the clot is spiral, and has clearly been passed through the ureteric orifice, which, like the openings of the penis and rectum, is so arranged that

material tends to pass in a spiral manner through the actual opening.

The spiral appearance of the clot, its position, and size, point to its having been passed through the left ureter. Beneath, and attached to the orifice of, the right ureter is a small spiral coil of pus of the calibre of the right ureteric orifice.

One evacuation of fluid through the orifice of the left ureter appeared to be slightly tinged with blood, but there could be no certainty about this point.

It now becomes clear that, whilst the patient complained only of pain on the left side, both kidneys, or rather both sides of the urinary tract above the bladder, are under suspicion.

Bearing in mind previous remarks relative to the condition of hypospadias, we shall attempt to prove beyond doubt the presence, separate and distinct, of both kidneys; for a case is on record of a single kidney situated on the left side secreting urine *viâ* two ureters, which occupied a normal position in the bladder, although they both came from the same kidney.¹

X-RAY EXAMINATION AND INVESTIGATION OF URINE.

We shall now proceed to make investigation, cystoscopic and X-ray, in order that the presence and conditions of the kidneys may be learnt.

We proceed thus:—A cystoscope is passed containing, in addition to the optical apparatus which is capable of being completely detached, an additional apparatus by which special catheters may be passed up the ureter into the pelvis of the kidneys. When this instrument is passed, without the optical apparatus, the bladder may be irrigated through it, and thus only one instrument is used for irrigation and investigation.

After the bladder is washed out, and its fluid contents come away clear, the optical apparatus is introduced.

A catheter, graduated in half-inches and made of thin wire, thus being opaque to X-rays, is passed up along each ureter for a distance of about nine inches, or more.

The cystoscope is removed, the catheters are left in place,

¹ *Journal of Anatomy*, 1914.

and the urine is collected through them from each kidney. The collection, during the first half-hour, is rejected, for it is able to tell us very little; the passage of ureteric catheters is apt to upset renal secretion for a short time, usually in the way of producing polyuria. After the lapse of half an hour, the urine is collected during a space of two hours, and reserved for chemical examination. The next collection is also for two hours, and is reserved for bacteriological examination.

Gross examination of the flow of urine shows us that the urine from the left side is secreted in varying quantities, and contains a good deal of blood and, apparently, pus. Sometimes the rate of flow is quick; sometimes it is slow. The urine from the right side flows at a constant rate, and contains a little blood and some pus.

The difference in the rate of flow from the two sides, and the different appearance of the fluids point to existence of two separate kidneys.

Later on, the flow from the left side ceased, whilst that from the right remained as it had been.

From this observation, we may suspect that the catheter is blocked with a small clot, or some pus; but, owing to its patency being proved by the next investigation, we may, perhaps, assume that the left kidney has temporarily gone out of action.

We will defer the further consideration of the specimen of urine, until additional investigation has been made, which may be known as the "anatomical investigation," as opposed to that previously undertaken, which may be distinguished as the "physiological investigation."

The anatomical investigation is undertaken with the help of X-rays. Ten per cent. collargol (English make) is allowed to fall from a funnel, placed two feet above the patient's body, into the pelvis of the kidneys. The pelvis of the left kidney is quite distinctly visible, and is perhaps rather larger than usual. The pelvis of the right kidney, owing partly to the presence of the liver, cannot be distinguished—the catheter on the right side appears to terminate opposite the lower border of the third lumbar vertebra. It is necessary for us to have photographs taken of these appearances. The photographs, taken by Mr. H. N. Eccles, merely confirm what

has already been said. The collargol has failed to enter the pelvis of the right kidney, which is, however, proved to be in existence, for two different urines are secreted from each side, and the photographs show us a left kidney which is normal in size and position, which a congenital solitary kidney never, or very rarely, is. Both catheters are proved afterwards to be patent. It may be, that the obstruction to fluid passing upwards, along the right ureter beyond the level of the third lumbar vertebra, is due to a congenital defect in the duct, or may be accidental. I prefer to believe that it is accidental, and, on account of the physiological investigation, to believe that both kidneys are present; this belief is supported by the collargol demonstration of the left renal pelvis.

Attention may now be directed to a continuation of the examination of the urine. The various specimens collected are as follows :—

Specimen A, collected by patient during attack of hæmaturia, which contains blood.

Specimen B, collected by patient after attack of hæmaturia has ceased, which contains pus.

Specimens C, and C¹, urine collected from left kidney.

Specimens D, and D¹, urine collected from right kidney.

The reports we have received from Dr. John Eyre and Dr. J. H. Ryffel are as follows :—

Specimens A and B—

“The deposit from the specimen of urine contained pus and blood. No casts or sarcoma cells were present, and no tubercle bacilli could be detected. Cultures gave a pure growth of *staphylococcus citreus*.”

Specimens C, C¹, D, and D¹—

“The deposits from both these specimens of urine contained pus, blood, and epithelial and granular casts. No tubercle bacilli could be detected. Cultures from left kidney specimen gave a growth of *staphylococcus albus* and *staphylococcus citreus*, and from the specimen from the right kidney only three colonies

of staphylococcus albus.

Dr. Ryffel gives the following chemical report :—

	R. Kidney.	L. Kidney.
Volume - - -	16 c.c.	21·5 c.c.
Reaction - - -	lightly acid.	acid.
Urea - - - -	1·84 per cent.	·57 per cent.
NaCl - - - -	·528 per cent.	·476 per cent.
Blood - - - -	present.	more than R.
Albumen - - -	present.	more than R.
Pus - - - -	Nil.	a few cells.

“In both specimens there is more albumen than corresponds to the amount of blood present.”

Report on the blood by Dr. Ryffel is as follows :—

“The blood contains urea 0·275 gram per 1,000 c.c., a normal value.”

DIAGNOSIS AND TREATMENT.

The patient has an affection of both kidneys of a septic nature, and involving the parenchyma of these organs. The infection is staphylococcal. There is no evidence of stone, tubercle, or growth, nor of a movable kidney. The more serious affection of the left kidney is perhaps due to the accumulation of fæces in the descending colon and sigmoid. The intermittent character of the hæmaturia is due, probably, to exacerbations of the inflammatory process in the left kidney.

As there is evidence that both kidneys are affected, no operation will be performed, although, when the chemical examination of the blood is taken into consideration, it would appear that they are doing their duty in the way of urea excretion. The treatment which will be carried out, is as follows :—

R	Acid. Boric.	-	-	-	gr. vj.
	Papain	-	-	-	gr. vj.
	Syr. Aurantii	-	-	-	3 iss.
	Aquam	-	-	-	ad 3 j.

IVtis horis sumendum.

Distilled or aerated waters are to be taken in as great a quantity as the patient can drink. No alcohol, tea, or coffee, are allowed, and no salt is to be added to the food. Boiled

milk, two pints in the day. A moderate quantity of meat and bread, and a little butter with three moderate sized potatoes will be taken during the day. A vaccine will be prepared and administered.

Salol and paraffin should be given regularly in order to clear the large intestine of gas and fæces.

The prognosis is not very good. Extensive degenerative changes have already taken place in both kidneys, from which they will probably not recover, even if the septic part of the disease is cured.

COMMENTS ON THE CASE.

The radiating character of the pain suggests a unilateral affection of the left kidney. Disease, however, is not confined to one kidney.

A careful examination of the case, with the aid of the catheterizing cystoscope, and a collection and investigation of the urine from each kidney, enables us to say that, in spite of the unilateral character of the symptom, both kidneys are affected. The kidneys, acting together, are at present doing sufficient work to enable the body to get rid of its urea. If one were disturbed by operation, the probability is that both would fail in their action.

Finally, let me impress upon you the two rules, which were given at the beginning of this demonstration.

- I. A case of hæmaturia should always be examined during an attack of hæmorrhage.
- II. Both kidneys should always be examined, even when unilateral disease is suspected.



RECENT WORK IN DERMATOLOGY—BULLOUS DISEASES.

By J. M. H. MACLEOD, M.D., M.R.C.P.

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OWING to the extra duties entailed by the war and the consequent diminution in research, the past year has been a comparatively barren one in so far as advance in our knowledge of skin diseases is concerned. The publication of the continental journals on dermatology has ceased, and although several excellent papers have appeared in the American journals, there has been nothing published of late which could be claimed as an important addition to our knowledge, either of the nature or causation of obscure forms of dermatitis or of methods of treatment.

In this country, the subject which has attracted most attention has been the "pemphigoid group" of the bullous diseases, owing to its having been chosen for special debate in the dermatological section of the Royal Society of Medicine in May of this year.¹

Although nothing new was forthcoming as a result of the debate, still it served to crystallize the existing views on the subject, and may be regarded as an up-to-date epitome of our knowledge of this group of eruptions. In this contribution, it is proposed to recount the conclusions then arrived at, and to preface this with a brief consideration of bullous diseases in general.

In spite of the immense amount of literature, which has collected around the subject of the skin affections characterized by bullæ, there are still a number of problems connected with it which are far from being settled. In the old days, the

¹ "The Pemphigoid Eruptions." Debate introduced by J. M. H. MacLeod, followed by Sir Malcolm Morris and Drs. J. J. Pringle, G. Pernet, Knowsley Sibley, Stowers, Adamson, Whitfield, Graham Little, Willmott Evans, S. E. Dore, Parkes Weber, and Stansfeld.

majority of bullous eruptions were classed under the heading of pemphigus, and various types were described, such as pemphigus acutus, pemphigus chronicus, pemphigus pruriginosus, pemphigus neonatorum, and a number of others, the different qualifying adjectives being used to indicate what were then believed to be variations in a common morbid process. As our knowledge became more precise, however, it was found that several of the conditions included under this heading differed from each other in their nature and ætiology, and some of them have been withdrawn from the group, with the consequence that the term pemphigus is now employed in a more restricted sense, and when used without qualifying adjective is generally taken to indicate a bullous eruption of the chronic pemphigus type.

The only satisfactory method of classifying diseases is on an ætiological basis, but, in the case of the bullous diseases, this is impossible, owing to the gaps which still exist in our knowledge of the causation of certain members of the group. For convenience of description, however, an attempt may be made to arrange the bullous affections according to what is known of their causation, and the following headings may be employed provisionally.

I. BULLOUS ERUPTIONS OF CONGENITAL ORIGIN.

There is only one condition which can properly be regarded as a congenital bullous disease, and this is what is sometimes described as "congenital pemphigus," but is more usually known as epidermolysis bullosa. It is a unique affection, in which there is a peculiar vulnerability of the skin on account of which the slightest injury from blows, friction, pressure, etc., causes a detachment of the epidermis with the formation of more or less tense blisters. Mild degrees of it are not uncommon, and, when they occur, constitute a serious handicap in life, for they prevent the sufferer from engaging in any occupation in which the hands are subjected to friction. In most cases, the condition is not noticed at birth but becomes apparent a few days later, and there is, as a rule, an hereditary history.

In the past, there has been some confusion between epidermolysis bullosa and a bullous congenital syphilide, but

the latter is not so widely distributed, being generally confined to the palms and soles, and is usually associated with other syphilitic stigmata.

2. BULLOUS ERUPTIONS RESULTING FROM THE INOCULATION OF CERTAIN SEPTIC MICRO-ORGANISMS.

A. *Bullous Impetigo*.—The most common example is the bullous variety of impetigo contagiosa, which is due to the local inoculation of the streptococcus pyogenes.

B. *Pemphigus Neonatorum*.—This is simply a bullous impetigo occurring soon after birth, and the result of the inoculation of streptococci on the delicate infantile skin. Epidemics of it were once common in lying-in institutions, etc., but it is now, fortunately, seldom met with. At first, it is a purely local condition, but, if unchecked, may become a general septic infection, possibly by the virus gaining entrance at the unhealed umbilical stump, and may assume malignant characteristics; hence the importance of early recognition of the disease and the immediate institution of anti-septic treatment to prevent a general dissemination of the virus.

C. *Pemphigus Acutus*.—Under this heading have been grouped cases of an acute bullous dermatitis, associated with constitutional symptoms of a septicæmic nature, and generally ending fatally. It may be met with in isolated cases, but has also been known to occur as small epidemics, chiefly among butchers and dressers of hides. It is the result of the inoculation of a virulent micro-organism through some abrasion of the cutaneous surface. Several micro-organisms have been incriminated in connection with it, but that most generally accepted is a diplococcus described by Demme.

D. *Pemphigus Vegetans*.—In this rare and usually malignant type of pemphigus, the bullæ in certain situations, such as about the axillæ, sides of the mouth, and genitalia, tend after breaking to be replaced by offensive vegetative masses. The precise organism responsible for this condition and its mode of entrance are alike uncertain; both streptococci and the bacillus pyocyaneus have been isolated from the contents of the blisters, and in one or two instances previous septic foci have been recorded, such as ulceration in the mouth, a septic finger, etc. It is possible that it is a variety of pemphigus

acutus, and that the vegetations are secondary phenomena due to the action of secondary micro-organisms, possibly staphylococci.

Mild cases of pemphigus vegetans have been described, which have not ended fatally but have persisted for years, subject to exacerbations and more or less prolonged remissions. These probably belong to a different category, and may be instances of chronic pemphigus or dermatitis herpetiformis, in which vegetative lesions have supervened from virulent staphylococci contaminating the bullæ.

3. BULLOUS ERUPTIONS DUE TO LOCAL IRRITANTS OTHER THAN BACTERIA.

A large number of irritants of animal, vegetable, and mineral origin, such as cantharides, certain poisonous plants, and substances like paraphenylene diamene, which is employed as a hair dye, are capable of causing a more or less acute inflammatory disturbance of the skin accompanied by bullæ.

Physical agents, such as sunlight, heat, and cold, may also give rise to a bullous dermatitis, and in this connection reference may be made to the somewhat rare condition known as hydroa æstivale, which is a recurrent summer eruption due to sunlight, affecting the exposed parts of the skin, and usually occurring in boys.

4. BULLOUS ERUPTIONS OCCURRING IN NEUROTIC AND HYSTERICAL WOMEN.

Under this heading may be placed the cases which have been recorded from time to time as pemphigus hystericus. As a rule, they are simply instances of dermatitis artefacta, the bullæ being produced artificially by some local application with the object of malingerer or of eliciting sympathy.

5. BULLOUS ERUPTIONS DUE TO DRUGS.

Certain drugs occasionally give rise to a bullous eruption in a susceptible individual, such for example as antipyrin, copaiba, chloral, chlorine, iodine, morphia, and quinine, even small doses being capable of causing it where a marked idiosyncrasy exists towards the drug.

6. BULLOUS ERUPTIONS DUE TO TOXINS RESULTING FROM IMPERFECT METABOLISM OR FOOD-POISONING.

In children, a bullous variety of papular urticaria is sometimes met with, as the result of some faulty metabolism or

improper feeding. When this is once set up, the slightest derangement is liable to determine a fresh outbreak of blebs.

In adults, a bullous dermatitis may follow a definite error in diet with the ingestion of some known toxic substance, or of something which, though usually harmless, has acted as a poison owing to some individual peculiarity. The bullæ may be localized to certain positions, such as the face, neck, forearms, backs of the wrists, hands, and extensor aspects of the legs, or they may be more widely distributed over the whole skin; as a rule, they develop on an erythematous basis, and are sometimes associated with urticarial lesions. The precise manner in which the toxin calls forth the eruption is not fully understood, but it is generally believed that it is not the poisonous substance ingested which is responsible for the bullæ, but some foreign protein eliminated by the tissue cells in response to it. Once the eruption has occurred, the phenomenon of anaphylaxis is liable to supervene, with a marked increase in the susceptibility of the patient to the poisonous substance in question and other allied toxic influences.

7. BULLOUS ERUPTIONS DUE TO TOXINS, THE NATURE AND ORIGIN OF WHICH ARE AT PRESENT UNKNOWN.

Under this heading may be placed provisionally chronic pemphigus and the multiform eruptions grouped together by Duhring with the title of dermatitis herpetiformis. Recently the name "Pemphigoid eruptions" has been applied to the latter group, because certain of the cases of dermatitis herpetiformis resemble chronic pemphigus clinically, though they are generally believed to be of a different nature.

A. *Chronic Pemphigus*.—It has long been a matter of controversy, whether chronic pemphigus and dermatitis herpetiformis should be considered different affections or variants of a common pathological process. Opinions were by no means unanimous on this subject at the debate, but the majority of speakers were in favour of distinguishing the two, while admitting that cases occur which may be regarded as transitional stages between them.

In chronic pemphigus, the blebs arise on apparently normal skin, the eruption is uniform, consisting entirely of blebs which

come out in crops or irregularly, have no tendency to herpetiform grouping, and are not associated with definite subjective symptoms, unless the blisters are broken, when more or less discomfort may arise from the raw surfaces.

B. *Dermatitis Herpetiformis*.—In dermatitis herpetiformis, the lesions are multiform, consisting of prurigo-like papules, vesicles, erythematous or urticarial patches, show endless differences in their distribution and grouping, sometimes forming circinate or gyrate patternings, but more often exhibiting a herpetiform arrangement like the clusters of vesicles in herpes zoster, and are accompanied, or occasionally preceded, by particularly intense subjective symptoms such as pricking, burning, itching, or actual pain of a markedly paroxysmal type. In both chronic pemphigus and dermatitis herpetiformis, the eruptions show a marked tendency to recur, and are rarely continuous, but exhibit remissions of various lengths. In dermatitis herpetiformis, the general health is usually well preserved at first, but after the affection has been present for some time, secondary disorders, which are chiefly of a nervous character, are apt to supervene as the result of the severe paroxysms of itching and insomnia, and the patient is liable to become emotional, neurotic, and prostrate. In rare instances, it has even been known to lead to insanity.

The blood condition in the pemphigoid eruptions has been studied extensively, owing to the occurrence in a considerable number of the cases of a marked increase in the coarse granular eosinophiles in the blood, contents of the bullæ, and cellular infiltration in the corium. The percentage has been known to reach as high as 69 in the blood, and 95 in the bullæ. The eosinophilia cannot be regarded as of pathognomonic value, however, for it is not constant, and cases are on record in which it was absent even at the height of an attack.

It was pointed out by several of the speakers at the debate that dermatitis herpetiformis seemed to be essentially an affection of adult life, and that the cases which had been recorded in children were doubtful, and more probably instances of chronic pemphigus, for the lesions consisted entirely of bullæ, there was no tendency to herpetiform grouping, and the subjective symptoms were negligible. Some of them, too, were possibly

cases of bullous erythema or vesicating urticaria.

The exact nature and causation of the pemphigoid eruptions still remain unknown. Pregnancy would appear to be not infrequently a determining factor, and numerous cases associated with that condition have been recorded under such headings as herpes gestationis and herpes gravidarum. In them the eruption sometimes occurs as early as the third month, or may not appear until after delivery; as a rule, it does not interfere either with the course of the pregnancy or the health of the child, but occasionally it has been known to lead to premature birth or death of the fœtus. More rarely eruptions of this type seem to result from disordered menstruation. Other causes, such as depressant nerve influences, chills, etc., have been cited, but definite proof of the connection is wanting. There is no evidence that dermatitis herpetiformis is the result of an acute infective process due to a primary microbic infection like acute pemphigus, but it would appear to be of toxic origin. The most generally accepted theory is, that it is an auto-intoxication from the circulation in the blood of some endogenous toxin, not necessarily of a specific nature, but which may be called forth by a variety of influences. It has been suggested that the toxin does not act directly on the skin by circulating in the cutaneous blood vessels, but indirectly through the nervous system—an hypothesis which would explain the similarity of the herpetiform grouping to that in herpes zoster, in which the eruption is dependent on changes in the posterior root ganglia, etc. In the cases which have been examined post mortem, however, no definite alterations have been observed, so far, either in the peripheral nerves, root ganglia, or spinal cord.

The treatment of the pemphigoid eruptions is unsatisfactory, and little advance has been made in it during the last 20 years. No specific remedy has been discovered, and the present methods cannot be claimed to be more than symptomatic, aiming at the relief of itching, the prevention of septic absorption, and the diminution of the irritation, general depression, and insomnia. Arsenic pushed to the limit of toleration has been known to have a controlling influence on the affection, but cannot be said to be curative, and the newer forms, such as the aryl arsenates, salvarsan, etc., have given

even less favourable results than Fowler's solution. Occasionally anodyne remedies, such as antipyrin or phenacetin, may relieve the irritation, but their use is to be deprecated, for they are apt to leave the patient in a state of lowered resistance. Cases sometimes improve, in so far as relief from the itching is concerned, on a low, almost starvation, vegetarian diet.¹ Recently, encouraging results have been recorded in a few instances from injections of human serum, both autogenous and heterogenous, obtained from apparently healthy individuals and administered as 30 c.c. injections, given intramuscularly about once a week and repeated six or eight times. These experiments have not yet received sufficiently extensive trial to establish their value however.

Locally, the treatment is purely symptomatic, consisting of anti-pruritic or anti-septic local applications, such as creams containing small quantities of menthol, glycerine of lead, or a zinc paste with or without the addition of tar.

¹ Howard Fox: "Human Serum in the Treatment of Skin Diseases," *Journ. Cut. Dis.*, 1915, XXXIII., p. 615.



ALOPECIA AREATA.

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THE condition known as alopecia areata was selected as one of the subjects for discussion in the Dermatological section of the 17th International Congress of Medicine, held two years ago; a large number of contributions, most of them relating to the ætiology of this interesting disease, were read. I think it will be of interest, therefore, to give an account of this condition, and at the same time discuss the various hypotheses as to its ætiology, giving a short analysis of 100 consecutive cases, together with a description of the most modern methods for its treatment.

DEFINITION.

Alopecia areata is a disease affecting the hairy surfaces of the body, most commonly limited to the scalp, but at times generalized; it is characterized by the production of one or more smooth rounded bald patches, unattended with other changes in the skin, and with a tendency to spontaneous recovery.

SYMPTOMS.

The chief characteristic of this disease is the formation of a bald patch, usually on the side or back of the scalp, but any surface of the body may be affected, alopecia areata of the beard area being frequently found associated with scalp baldness. A bald area may develop rapidly during the night, so that a mass of hair is found on the pillow on rising in the morning; but usually the hair comes out more slowly, some weeks elapsing before the fall is complete. Several patches may appear at the same time, and by coalescence may induce baldness over large areas of the scalp; the distribution and shape of the patches often resembles those produced by the microsporon of ringworm. The size of a patch varies from that of a shilling to the palm of the hand, the borders are defined, and the skin frequently pinkish in

colour; its surface is smooth, white, and without scaliness, and in some cases a few solitary hairs remain in the patch; in other cases black dots, the remains of hair roots, are seen scattered over the bald area. The surface of a patch, especially one of long duration, may be slightly depressed, but the scalp underneath is not more adherent than elsewhere. The hairs at the periphery of a patch are often loose and broken or, when pulled upon, break easily; a spreading patch may be recognized by the hair at the edge being loose. A hair that has been removed with forceps shows an atrophied root, the shaft tapering down to a fine point, instead of terminating in a bulbous extremity; such hairs have been likened to a "note of exclamation" mark, and are a diagnostic feature when this disease has to be differentiated from ringworm.

It should be remembered that the hair on the scalp, after exposure to a full Sabouraud dose of X-rays, frequently presents atrophied roots resembling the above. There are, as a rule, no subjective sensations, but a bald area is sometimes slightly anæsthetic and is much less sensitive to stimulating applications than other parts of the scalp.

This description applies to the form of alopecia areata usually met with. There are two other varieties which it is necessary to mention.

Band type or Ophiatic.—This variety usually begins in the nape of the neck, and extends forward along the lower border of the hair, forming a *broad* band of baldness. It is met with less often than the patchy form, and is usually seen in children.

Universal alopecia.—Alopecia areata, besides affecting the scalp and beard, may occur on other parts of the body, *e.g.*, pubes axillæ, eyebrows. More rarely a malignant generalized form is met with, usually in middle-aged adults, in which every hair all over the body is shed. A dystrophic affection of the nails is frequently associated with this universal alopecia, the nails becoming striated or pitted with shallow holes or transverse ridges; or, more rarely, the nails may be shed at the same time as the hair. The thumb nails are most frequently affected, and the condition is symmetrical.

Course.—The course of this disease is variable; it may

persist for months or years, but usually the hair returns in from 6-12 months. New areas of baldness may appear while the older ones recover, or the hair may return over an area and then repeatedly be lost again over that area. During regrowth, the hair appears as a fine, white, down-like growth, which is gradually replaced by stronger and stronger hairs until the normal, medullated, pigmented hair is left.

ÆTIOLOGY.

Alopecia areata is met with in this country in about 3.5 per cent. of all cases of skin disease; in America, 1 per cent.; Germany, 1.5 per cent.; France, 4 per cent. (Jackson). Norman Walker in 4,000 cases of skin disease found alopecia areata in 5 per cent.

Alopecia areata is commoner in the dark haired, and in the male sex, but these are by no means marked clinical characteristics; Sabouraud finds it twice as frequent in the male as in the female sex. It occurs chiefly between the ages of 10-20, but instances outside these limits are not uncommon.

Most observers are agreed that there is no evidence of a syphilitic ætiology. Nobl of Vienna considers that familial and hereditary factors play a considerable rôle in its ætiology, and Sabouraud agrees with him in this, for in an analysis of 500 cases of alopecia areata, 20 per cent. gave a definite family history.

My own results, after an examination of 100 cases of alopecia areata, are as follows. There was no appreciable preponderance among the dark-haired or the male sex, the figures being 51 and 56 respectively. A family history of a previous similar alopecia was high, viz. 67 per cent., but it is probable that many of these cases include diseases such as ringworm and other scalp maladies. 72 per cent. of the cases were between the ages of 10-20. A history of syphilis was obtained in 8 per cent.; of headache in 66 per cent.; and of neuralgia in 42 per cent. Dental caries was present in nearly every case; but this proves nothing, for nearly all patients, both private and hospital, have faulty teeth. These figures agree in the main with those of other observers.

There are at the present time four hypotheses as to the causation of this disease. Some consider it to be a neurosis, and

others hold to the belief that it is due to an infection with a parasite; more recently, a relationship between this disease and interference with the function of the ductless glands has been noted, and, lastly, it is believed by some to be an auto-intoxication.

I. *Neuropathic*.—In favour of a nervous origin, the following facts may be adduced:—

1. Nervous disturbances, such as shock, anxiety, fright, injuries, have frequently been shown to precede an attack of alopecia areata.
2. Max Joseph has produced alopecia areata in cats after section of the second cervical nerve.
3. Alopecia has been shown to cover some definite nerve area. Sequeira describes a well-marked case in which the bald area was that supplied by the first division of the fifth nerve on one side and by the supra-trochlear nerve on the other.
4. Reflex irritation from dental caries has been advanced by Jacquet as a probable cause; this is doubtful, for the nerve supply of the affected teeth and Head's areas do not correspond.
5. Neuralgia, itching, anæsthesia, which sometimes precede or accompany this condition, point to a nervous origin.
6. The fact that the hair falls, as a rule, rapidly.
7. It is met with frequently in association with vitiligo, sclerodermia, and other conditions of neuropathic origin.
8. Universal cases frequently show dystrophies of the nails, suggesting generalized *trophic* affection.

II. *Parasitic*.—In favour of this hypothesis, several French observers have described epidemics of alopecia areata occurring in schools, barracks, and other public institutions. In America, Bowen has recorded an epidemic in a girls' school. In this country, there was an epidemic among 35 policemen, of whom 12 were attacked; these men were accustomed to rest on certain couches, and developed alopecia areata on

those areas of the scalp, which came in contact with the pillow. Quite recently, at Bethnal Green Schools, 20 girls were attacked and presented typical patches of alopecia areata with "point of exclamation" stumps.

Cases have been reported as well in which alopecia areata of the scalp has followed a visit to the hairdresser's, especially when the hair-clipper has been used; it has followed the wearing of a hired wig at amateur theatricals. On the beard area, it has followed the wearing of a carnival mask, and after a shave at the barber's.

Sabouraud and others have described various bacilli as the cause of the disease, but, so far, no true case of alopecia areata has been produced by the inoculation of microorganisms. This was definitely proved by Jacquet, who made 1,100 inoculations without result.

Certain characteristics of the bald patches of alopecia areata strongly suggest a parasitic origin, viz. :—

1. Some fresh patches are pinkish and inflammatory in appearance.
2. The distribution and method of spreading of the patches is similar to that of ringworm.

There is a form of ringworm in which bald patches resembling alopecia areata occur, and which is known as "bald ringworm"; the resemblance is very marked, and it can only be differentiated from alopecia areata by the presence of infected hairs at the periphery of the patches.

It may be, therefore, that alopecia areata is a form of bald ringworm.

In this country, Sir Jonathan Hutchinson and Crocker were advocates of the parasitic theory, the former observer going so far as to believe that, when alopecia areata was met with in adults, ringworm had been an antecedent in childhood.

III. *Endocrinous*.—Sabouraud has recently advanced the view that alopecia areata is associated with some interference in the function of the endocrinous organs, such as the thyroid, ovary, suprarenal glands, etc., which are known to have an internal secretion. The literature in connection with this hypothesis abounds with conflicting views, so that up

to now there is very little definite evidence to rely upon.

According to this authority, alopecia areata is found associated with exophthalmic goitre, suppression of the menses, pregnancy, ovarian troubles, tuberculous testicles; he finds, too, that, in women, a large number of cases occur about the climateric.

In favour of this theory, certain cases under my care, in which all remedies were unavailing in restoring the hair, were quickly cured by the internal administration of these gland extracts, generally thyroid, the hair beginning to grow rapidly. Unfortunately, no record has been kept of these cases, but for many years I have used thyroid, etc., in obstinate cases of alopecia areata with marked success.

After studying the evidence in favour of these several views, one must admit that certainly all classes of case occur. The parasitic hypothesis is so well supported by evidence that it is impossible to question it; but, on the other hand, the large majority of cases are undoubtedly of neuropathic origin. That the endocrinous theory is in some cases correct is certainly borne out as the result of treatment, and autointoxication from gastric and oral disturbances would seem to offer a solution in not a few cases.

In every case, however, some functional disturbance of the nervous system is probably present, and may be the cause of the alopecia.

Alopecia areata should be regarded, not as a definite disease, but rather as a syndrome, resulting from some interference with the hair-producing process. Such interference may arise from four main causes:—

1. Irritation, shock, or injury to the nerves supplying the part.
2. Periperal irritation of parasites or their toxins, either directly upon the trophic nerves or primarily on the tissues.
3. Excess or deficiency of some internal secretion.
4. Toxæmia from absorption of intestinal or oral poisons.

HISTOLOGICAL.

The primary condition is an inflammatory one, involving the corium, whilst round-cells are seen surrounding the blood-

vessels.

In older specimens, thickening of the blood-vessels is seen, together with atrophy of the sebaceous glands and fatty tissues.

Degenerative changes are met with in the hair bulbs and that part of the hair just above the bulb.

DIAGNOSIS.

This, as a rule, presents little difficulty; the diseases of the scalp from which alopecia areata has to be diagnosed are ringworm, favus, alopecia syphilitica, lupus erythematosus, pseudo-pelade, and folliculitis decalvans.

In contradistinction to *ringworm* and *favus*, alopecia areata has usually a sudden onset, there are no twisted stumps, scales, crusts, or evidence of inflammation. On microscopical examination, no fungus is found. The epilated hair has an atrophied root resembling a "note of exclamation" mark.

Alopecia syphilitica sometimes resembles alopecia areata very closely, but the usual form in which it attacks the scalp is shown by a moth-eaten appearance of the scalp which is distinctive, and, in addition, the usual signs of syphilis are present, also the administration of antisyphilitic remedies is rapidly followed by improvement.

Lupus erythematosus has, besides the bald patches on the scalp, scars or inflammatory areas on the face, nose, ears, or hands; the bald areas on the scalp are irregular, frequently inflamed, and are covered with adherent scales. In old cases, the patches are thin, ivory white, and atrophied.

Pseudo-pelade is a very rare condition; the patches of baldness are irregular, the skin is atrophied and thin, the disease spreads very slowly. There is no previous inflammation.

Folliculitis decalvans is also a rare condition; it is a folliculitis of the scalp, leading to cicatrization and baldness. The patches are irregular, but at the edges there are papules or pustules surrounding the hairs; the skin is white, depressed, and atrophied.

TREATMENT.

Owing to the directly opposite views held as to the causation of alopecia areata, two main methods of treatment

are in force. Those who favour a nervous origin advise attention to constitutional derangements, together with local stimulation of the bald areas ; while those favouring a parasitic origin have recourse only to antiseptic stimulant measures. As most of the stimulating preparations employed are also antiseptic in action, they are employed by both parties with equally favourable results.

From the time of Celsus, an enormous number of drugs and forms of treatment have been recommended to produce a growth of hair on the head. Where many and varied remedies are advocated, one may well infer that there is no drug known that will with certainty make the hair grow.

None of these remedies, with the exception of pilocarpine, have any action in promoting hair-growth ; these fanciful remedies have mostly been advocated after a limited trial attended with accidental success, and not as a result of a prolonged trial extending over a series of cases.

It should be remembered that the disease itself tends to spontaneous recovery, so that cases of reported cure are probably really instances in which the disease has terminated, not from the action of the drug, but from a cessation of whatever was interfering with the hair-producing process.

Preparations containing ammonia, cantharides, rosemary, and quinine are popularly believed to promote hair-growth ; for many years they have been boomed as specifics by hairdressers, chemists, beauty specialists, hair specialists, and vendors of patent hair restorers, who make an enormous profit on each bottle containing one or other of these drugs which they sell. At hairdressing establishments such preparations are a profitable side line ; the hairdresser's assistant, as a rule, gets a large commission on any sales he effects, it is, therefore, to his interest to dispose of as many bottles as possible, and naturally his eloquence as to their virtues and potency knows no limit. With regard to the value of these lotions, etc., in restoring lost hair, one has only to note the prevalence of bald or thin-haired hairdressers or chemists to bring immediately to the mind the appropriate quotation from Holy writ : " Physician, heal thyself."

It has been so dinned into the ears of the British public that the drugs, previously mentioned, are necessary to restore the

hair to its former pristine luxuriance, that now-a-days a constant demand has arisen for one or other of these preparations, and so this industrial farce goes merrily on, continuing in all prosperity to lighten the pockets of the uninitiated.

Very strong solutions of the drugs have, it is true, a stimulating and antiseptic action on the scalp, but as prepared and sold they are not usually of sufficient strength, and their value is practically nil. However, being in most cases harmless, their use is not attended with prejudicial results, beyond the fact that their cost is out of all proportion to their value. To digress for a moment, I should like to mention another popular superstition, fondly cherished by the public and diligently nursed by hairdressers, that may be consigned to the limbo of exploded legends and fairy tales; this is the wide-spread belief in the efficacy of singeing the hair. The tubular idea, prevalent among the majority of hairdressers and the general public, that the hair after cutting bleeds like the branch of a tree, and that singeing, besides sealing the end acts as a germicide, is no more true nor is the treatment more effective than applying pomade to some malignant growth of the skin. The microscope shows the hair to be a solid rod resembling a horn, and that by no possible means could anything exude from it. Recent advances in medicine show that destructive processes of the hair—splitting at the ends being an example—owe their origin either to some organic or some functional disturbance of the hair follicles. Treatment should, therefore, be directed to these appendages of the skin either by local measures or constitutional remedies.

I am fully conscious that these observations may cause a storm of protest from the ranks of those interested in the sale of hair-restoring preparations, and, although I have no wish to injure the interests of many hard-working members of such old-established trades as the chemists and hairdressers, it is necessary that the medical profession should be in the position to warn people of limited means from committing themselves lavishly to sterile expenditure over wholly unprofitable commodities.

GENERAL TREATMENT.

In every case of alopecia areata one should examine the patient for constitutional derangements, such as anæmia,

dyspepsia, rheumatism, renal insufficiency, and treat accordingly.

Particular attention should be directed to the mouth for defective teeth, the throat for adenoids, and the eyes for errors of refraction.

Next, the general condition of the nervous system should be considered. Mental depression and headache are not infrequently complained of; in fact, headache is so often met with in alopecia areata, that a connection between them seems certain, but so far this has not been shown to exist. For such cases, tonic treatment is indicated by means of arsenic, phosphorus, iron, cod-liver oil, quinine, and strychnine; further, sea-bathing, general massage, and electricity are of value for their stimulating effects.

The only drug that directly influences hair-growth is pilocarpine, and its action is by no means marked; it may be given in tabloids, gr. $\frac{1}{8}$ to gr. $\frac{1}{4}$, by the mouth, or injected hypodermically in doses of $\frac{1}{30}$ to $\frac{1}{10}$ gr. The patient requires careful watching during its administration, on account of its inhibitory action on the heart-muscle, as well as the excessive perspiration produced, which renders him very susceptible to chills; it is, therefore, advisable to order flannel to be worn day and night next the skin during its administration.

In some cases, good results will be obtained by the employment of extracts of the ductless glands; a favourite combination of mine is thyroid and pituitary, which often gives good results in severe and obstinate cases.

LOCAL TREATMENT.

The object of local treatment is, first, to destroy any parasite (if present) by means of antiseptics, and, secondly, to stimulate the bald area by irritating applications. In this way, blood is brought to the part and the nutrition of the hair-roots improved. These two conditions are easily combined by prescribing a lotion as follows:—

R	Hydrarg. perchlor.	-	-	-	gr. $\frac{1}{2}$.
	Acid. Acetic. glac.	-	-	-	m. iij.
	Resorcin.	-	-	-	gr. v.
	Chloral. hydrat.	-	-	-	gr. x.
	Spt. Vini (60 per cent.)	-	-	ad	℥j.

This should be rubbed, twice a day, into the bald areas with a stiff brush. After a little while stronger applications may be employed. It is remarkable how quickly the scalp becomes accustomed to strong applications. A very good plan is to paint the bald area with Liq. epispasticus from time to time, so that a blister forms; it is of value, though a somewhat unpleasant procedure. An almost equally good result may be obtained by painting twice a day with a solution of 12 per cent. lactic acid. Chrysarobin gives good results, and is preferably employed as a paint so as to avoid staining other areas: one part chrysarobin to ten parts of traumaticin, painted over the bald area twice a day.

Other local measures giving good results are:—

ULTRA-VIOLET RAYS.

These rays are given out by the Finsen lamp and the quartz mercury vapour lamp. It is very necessary that they should come through quartz and not glass, the actinic rays being absorbed by glass. This method of treatment gives brilliant results. Exposures should be given three days a week.

BIER'S SUCTION APPARATUS.

Suction applied over the bald area for five minutes twice a day is of undoubted value; a hyperæmia is readily produced. One should endeavour to obtain a cup as near the size of the bald patch as possible.

FARADIZATION AND HIGH FREQUENCY.

The faradic current applied daily by means of a wire brush, and the high frequency effleuve from a glass vacuum electrode or from the brush attached to the top of the resonator, both produce a mild inflammatory reaction and give good results.



ALOPECIA AND ITS TREATMENT.

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ALOPECIA is a general term applied to all and every type of baldness, from a partial thinning to a complete loss of hair. Although usually associated with the hair of the scalp, it may appropriately be used for loss of hair on any part of the body, such as the beard, moustache, eyebrows, eyelashes, axillæ, pubis, trunk, or the limbs.

Cases of alopecia generally come under one of three classes :—

1. Congenital.
2. Senile.
3. Premature.

1. Congenital baldness is a very rare condition, and usually associated with a defective development of other epiblastic structures, such as the teeth and nails.

2. The senile form of alopecia is usually seen in men of advancing years, being relatively uncommon in women. It is usually preceded by some greying of the hair.

3. The premature alopecia is usually divided ætiologically into two varieties ;—

- a.* The Idiopathic.
- b.* The Symptomatic.

a. The former, the idiopathic premature alopecia, is in many respects similar to the senile alopecia, occurring without recognizable causes, except hereditary predisposition.

b. The symptomatic premature alopecia may be temporary or permanent, gradual or sudden in its onset.

The causes are constitutional or local, the constitutional being the acute specific fevers, cachetic conditions, such as phthisis, diabetes mellitus, syphilis, leprosy, neuroses, sudden

shocks or prolonged anxiety.

The local causes are—

- (1) Chronic seborrhœa.
- (2) Inflammatory diseases of the scalp, such as erysipelas, small-pox, psoriasis, and eczema.
- (3) Lupus erythematosus, morphœa, folliculitis decalvans.
- (4) Keratosis folliculitis of ichthyosis.
- (5) Parasitic diseases, such as ringworm and favus.
- (6) Syphilis, general cachexia with local eruptions.
- (7) Local injuries, such as blows, stings, friction, X-ray and other burns.
- (8) The neurotic and parasitic form of alopecia areata.
- (9) Reflex nerve disturbances, especially the result of dental troubles.

In studying the question of alopecia, it must always be remembered that the life of a human hair is limited, and that it is not shed periodically as in some animals, but there is a continuous slow falling, perhaps rather more marked during the summer than the winter months. Moreover, there is an active growth of hair at certain periods of life :—

At birth—the hair of the scalp.

At puberty—that of the face, axillæ and pubis.

In old age—strong hairs known as vibrissæ, tend to grow from the nostrils, ears, and eyebrows.

In women at the menopause—hair often grows on the face.

In pregnancy—in some cases a downy growth may become stronger, in others less, but in these cases the growth tends to reappear on the re-establishment of the menses.

The average length of a hair of women in this country has been roughly stated to be about 30 inches, and all of these full-grown hairs will be normally shed sooner or later.

When a pathological falling of the hair occurs, shorter hairs will come out together with the long ones, and the proportion of short to long hairs is an index to the amount of trouble present.

For diagnostic purposes, the combings of all hairs should

be collected for three consecutive days, and divided into two groups, those over and those under six inches in length. If the shorter hairs attain to one third in number of the longer ones, the fall is abnormal. If, on the other hand, the long ones are abundant, it does not follow that the shedding is a pathological one.

ÆTIOLOGY.

In discussing the question of the ætiology of baldness, the following have been considered as possible causes:—

The wearing of hard and heavy hats, partially arresting the circulation in the scalp.

Tight collars, impeding the circulation of the blood to head.

Shallow breathing, leaving an excess of residual air, giving rise to toxins.

Wetting the head too frequently,—water forms an emulsion with sebum and scales, which blocks the follicles, and leads to an atrophy of the hair.

Indoor occupation,—mental workers.

Derangement of the digestive or the genital organs.

Baldness in general is far more common in men than in women, and probably for the following reasons:—

a. Women give more attention to their hair than men, and so detect, and earlier seek to remedy a commencing seborrhœa.

b. Histologically, the connective tissue bundles of the scalp are larger in women than in men, and so the cushion of fat is longer preserved.

c. Women are chest-breathers, and are not so liable to a toxæmia as the result of an excess of residual air.

d. Women seldom wet the scalp with water.

e. They do not wear tight-fitting hats of impermeable material, and if they do the thickness of the hair covering the scalp would prevent the pressure of the hat-band arresting the circulation of the scalp.

PROGNOSIS.

On the questions of prognosis and treatment, everything depends on the causes of the baldness. Generally speaking

(excluding cases of folliculitis decalvans, in which there is an inflammatory process affecting, and completely destroying, the hair follicles and giving rise to the formation of cicatricial tissue), in the case of the ordinary forms of baldness, the more pathological condition there is to be seen on the surface of the scalp the better the prognosis; that is to say, those scalps which appear to the naked eye to be normal in appearance, are far more difficult to deal with than those on which a definite seborrhœa capitis is present.

TREATMENT.

Before, therefore, attempting to treat any case of baldness, a definite diagnosis of the pathology must be made out, or time and labour will be wasted and much harm may result. For instance, if a scalp, the condition of which is obviously an inflammatory one, be treated with stimulating or irritating applications, the process will be greatly aggravated, and much permanent harm may ensue.

If, on the other hand, the scalp is one which is pale and anæmic without any obvious naked-eye pathological changes, and an ordinary sedative application be applied, the condition cannot be improved, and valuable time may be lost, for there is no doubt it is much easier to arrest a commencing baldness, than it is to restore the growth of hair which has once been lost.

The treatment, in the majority of cases of baldness in young people, resolves itself into the effective and scientific treatment of seborrhœa capitis. First arrest, then cure the seborrhœa, and if this is not of too old standing, a regrowth of hair will occur.

The seborrhœic scalp should be washed as soon as much scurf has collected, generally not more frequently than once a week. The best shampoo is one consisting of equal parts of soft soap and spirit. If the scalp is very inflamed and sensitive, Parke Davis's fluid extract of soap bark (*quillaia saponaria*) is a useful substitute for a spirit soap solution.

The following are the drugs most frequently prescribed, euresol, hydrocyanic acid, ichthyol, lead, lysol, mercurial preparations, quinine, resorcin, salicylic acid, sulphur, and tar. Of these, resorcin will generally be found to be the most

efficacious in a 2 per cent. solution. It is freely soluble in water, and should be rubbed into the whole scalp once a day. Even in a 2 per cent. solution, especially if it has been made some time, it will have a slight staining effect on fair or white hair. In these cases, euresol, which, however, is insoluble in water and requires spirit to dissolve it, may be substituted.

If a resorcin lotion is being used, care must always be taken that no alkaline preparations, such as alkaline soaps, are applied to the scalp, or a considerable dyeing of the hair will ensue; if therefore it is desirable to add an oil to the preparation used, some tincture of soap bark (tinct. quillaia) and not an ordinary soap should be used, such as :—

R Resorcin.	-	-	-	gr. x.
Ol. Ricini	-	-	-	m. xxx.
Tinct. Quillaia	-	-	-	m. xv.
Aquam Rosam	-	-	-	ad ℥i.

Of the tarry preparations, liquid carbonis detergens for a watery, and oil of cade for an oily preparation will be found the most useful :—

R Ol. Cadini,				
Sp. Rectif.	-	-	-	ana m. x-lx.
Paraffin. Liquid.	-	-	-	ad ℥i.

If the scalp is red and inflammatory, the following are useful prescriptions :—

R Liq. Carbonis deterg.	-	-	m. xx.
Acid. Hydrocyan. dil.	-	-	m. v.
Glycerini	-	-	m. x.
Aquam Rosam	-	-	ad ℥i.

or

R Liq. Plumbi subacet. fort.	-	-	m. x.
Liq. Carb. deterg.	-	-	m. xv.
Glycerini	-	-	m. xxx.
Aquam Rosam	-	-	ad ℥i.

Salicylic acid, a most useful preparation in seborrhœa, is insoluble in water, and requires a considerable amount of spirit to dissolve it, but in cases of an oily seborrhœa it is very beneficial.

Sulphur, another favourite preparation for seborrhœic

conditions, can only be applied in a lotion in suspension. Ichthyol is soluble in water, and may be substituted; its colour and odour, however, are objectionable. Thiol and thigenol are also useful for lotions.

Having cured the seborrhœa, a more stimulating preparation may be substituted, the condition of the scalp being carefully watched from time to time, to determine the recurrence of any early signs of seborrhœa, when the stimulating applications must at once be stopped. The following are the preparations most commonly prescribed as excitants or stimulants of hair growth:—

Ammonia, cantharides, carbolic acid, chrysarobin, formalin, and lysol. Of these, lysol, in from 1 to 10 per cent. solution, will be found the most efficacious, if the objection to its odour, which is difficult to disguise, is not insuperable.

When it is realized that the morbid process occurs not on the surface of the skin, but in the sebaceous glands and hair follicles, and that no medicinal preparation, as applied in the form of a lotion or ointment, is absorbed by the skin, and that even the powers of penetration of a liquid application are very limited, a comparative failure in many cases of any of the above remedies is easily understood.

ELECTRICAL TREATMENTS.

The modern electrical treatments, penetrate through the surface of the skin to the deeper structures. Small repeated doses of X-rays are very useful for stimulating the growth of hair. Except, however, in cases of almost complete baldness, this agent is not desirable, for even in small doses frequently repeated, there is always a risk of temporarily increasing the alopecia.

Ionization, or ionic medication, the term used to designate the introduction of dissolved drugs through the skin, by means of the constant or galvanic current of electricity, is a process by which it is possible to apply a drug to the deeper structures of the skin, in other words, to cause both its penetration and absorption. By this process it is, therefore, possible, in the first place, to apply a drug for the destruction of the micro-organisms deeply seated in the scalp, and in the second place, to stimulate the hair follicles into active growth; so

much is this the case, that hair follicles which have been dormant for many years, may be stimulated once more into activity.

Of the numerous preparations generally used, one of the zinc salts is the most efficacious, and the treatment in bad cases must be applied for two or three days a week for several months.

In the case of pale anæmic scalps, the high frequency current from a vacuum electrode, or the effleuve from a metallic one, will produce a considerable hyperæmia and local reaction, with beneficial results.

VACCINE.

In bad cases of seborrhœa, a vaccine prepared from the acne bacillus will often be very helpful, if continued for a sufficient length of time, and given in large enough doses, from 5 to 200 or more millions.

MASSAGE.

In many case of baldness, especially of old standing, the hairy scalp will be found to be very bound down and adherent to the skull. In these patients, a special form of massage, which raises and so frees the scalp from the bone, will be found very efficacious not only in freeing the subcutaneous tissues, but in increasing the circulation in the parts as well.

In conclusion, it may be stated that if a seborrhœic patient is going to be bald in middle life or even old age, the symptoms of alopecia will show themselves between the ages of 15 and 25.

Although the hair may gradually become generally thinner as years advance, it is very unusual for a severe form of baldness to begin after this period of life.



MITRAL STENOSIS AND ITS PECULIARITIES.

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OF all the cardiac lesions mitral stenosis is, perhaps, the most interesting, not only on account of its many peculiarities, but also because of its generally satisfactory response to treatment. In the average case the diagnosis is simple; but there are many cases in which the diagnosis is rendered hard in consequence of the absence of the typical signs.

In this brief study of the condition, although the ordinary physical signs and symptoms of an average straightforward case are mentioned, it will be the endeavour of the writer to lay particular stress on the peculiarities of mitral stenosis, and on the pitfalls associated therewith—pitfalls in diagnosis, in prognosis, and in treatment.

The close association of mitral stenosis and auricular fibrillation renders a knowledge of one essential to the successful treatment of the other. Since from 60 to 70 per cent. of cases of heart failure are to be ascribed to the advent of auricular fibrillation, the treatment of this condition becomes one of great importance.

ÆTIOLOGY.

Mitral stenosis is more common in women than in men. The reason given for this by Sir William Osler is that rheumatism and chorea are more common in that sex. Fibrillation of the auricles is more common in men on account of the greater number of cases which in this sex falls into the non-rheumatic group (Lewis). The greatest number of cases have a history of rheumatism, chorea coming next. But there are many cases, especially in women, in which neither rheumatism nor chorea has existed. There must, then, be other causes. Apart from rheumatism and chorea, I believe tonsillitis is responsible for a fair proportion of cases. I have

seen a considerable number of examples in which endocarditis has followed directly on tonsillitis, and I believe this is a more frequent source than is generally believed. The tonsillitis may, of course, be of a rheumatic origin. Endocarditis has been known to follow erysipelas, and there does not seem to be any reason why it should not follow on many acute, though apparently trivial, affections. That there are many cases of mitral stenosis, in which no history of any definite illness can be obtained, seems to lend colour to this view. Many of these individuals, and their relatives, strenuously deny any history of either rheumatism, chorea, or tonsillitis; but they will frequently refer to "feverish attacks," and to attacks of "poisoning," and of "blood-poisoning"—by "blood-poisoning" meaning, probably, some septic state.

AGE.

Mitral stenosis is rare in the very young; and auricular fibrillation is almost unknown under sixteen years of age, though stenosis is common enough at this age. In early youth, there does not seem to be the same selective affinity for the muscular structures of the heart. Yet, children with mitral stenosis do not, as a rule, live very long; but cardiac failure in their case does not seem to be associated with auricular fibrillation. Generally, they die from progressive enlargement, dilatation, and pulmonary congestions. The greater number of the victims to stenosis are between 20 and 30, and 30 and 40.

RELATIVE GRAVITY OF STENOSIS.

The detection of mitral stenosis is possible only after cicatrization has taken place; originating in scar formation, it is frequently progressive. This progressive nature adds to its seriousness. Among valvular lesions it is the second most grave, aortic regurgitation being the most grave. Its close association with auricular fibrillation lends to its gravity; the advent of this means greater cardiac embarrassment still. Its seriousness is also added to on account of the greater frequency of cerebral embolism, and the greater liability to, and danger from, pulmonary congestions.

SYMPTOMS AND PHYSICAL SIGNS IN COMPENSATED CASES.

Mitral stenosis may exist for years without the patient

being aware of it. The first warning is shortness of breath on exertion, and palpitation is common. In a well compensated case, there are practically no other symptoms. The physical signs at this stage are:—

- (a) The crescendo presystolic, or auriculo-systolic bruit;
- (b) The typical presystolic thrill;
- (c) The peculiarly sharp and accentuated first sound in the mitral area;
- (d) The shock of the first sound;
- (e) Diminution or absence of the second sound in the mitral area;
- (f) Reduplication or accentuation of the second pulmonary sound.

The murmur, the thrill, and the shock are synchronous.

SYMPTOMS AND PHYSICAL SIGNS WHEN COMPENSATION IS BROKEN.

- (a) Dyspnoea;
- (b) Palpitation;
- (c) A rapid and very frequently irregular pulse;
- (d) Dilatation—the strain falls mostly on the right heart which becomes engorged and dilated;
- (e) Enlargement and perhaps pulsation of the liver;
- (f) Scanty, albuminous, and lithate-laden urine;
- (g) Pulmonary signs—basal œdema, bronchitis, and pulmonary congestions, varying in degree from a simple pulmonary catarrh to a broncho-pneumonic state. The expectoration may be copious and frothy, rusty and tenacious, or may be incorporated with bright red blood;
- (h) Œdema—with stenosis this comes on in the later stages only;
- (i) Advent of auricular fibrillation;
- (j) Cough—this may be very troublesome and difficult to relieve quickly;
- (k) Sickness—there may be persistent nausea.
- (l) Relative tricuspid incompetence—this acts as a safety valve;
- (m) The typical presystolic bruit vanishes and frequently gives place to a systolic murmur; in advancing conditions, a diminuendo mitral diastolic murmur may appear;
- (n) Cyanosis—this generally amounts to a bluish tinge

only, though in the later stages it may be very pronounced.

SIGNS AND SYMPTOMS BY WHICH MITRAL STENOSIS MAY BE DETECTED IN THE STAGES OF BROKEN COMPENSATION, WHEN THE CHARACTERISTIC PRESYSTOLIC MURMUR IS ABSENT.

1. The sharp accentuated first sound is characteristic, and is in itself strong evidence of the presence of stenosis, though the typical bruit may be entirely absent.

2. The accentuation or reduplication of the second pulmonary sound.

3. Engorgement, dilatation, or enlargement of the right ventricle.

4. Signs of pulmonary catarrh in varying degree.

5. Hæmoptysis occurring in a valvular lesion where compensation is broken.

6. Reduplication, diminution, or absence of the second sound at the apex.

7. Enlargement and tenderness of the liver.

8. The presence of the characteristic pulse of auricular fibrillation is strongly suggestive of stenosis.

CHIEF COMPLICATIONS.

The most serious complication is embolism of the cerebral vessels. These emboli do not as a rule tend to recur.

Auricular fibrillation is a serious complication, for it further embarrasses the action of the heart.

Hæmoptysis may occur, and may prove fatal. A moderate hæmoptysis may do good, in so far that it may relieve a labouring right heart.

Pulmonary catarrhs and congestions, bronchitis, and varying grades of broncho-pneumonia may all prove formidable complications.

THE HEART IN MITRAL STENOSIS.

The heart is generally said not to hypertrophy much in mitral stenosis, and it is also stated that the enlargement almost always falls on the right heart. This may be true in the main, but it is far from accurate. I know several patients now, who, from a pure mitral stenosis, have an apex beat in the region of the posterior axillary line. One patient has had stenosis for 25 years, and this is the position of her apex beat. These patients have been able, of course, to take life very

easily; but they have braved long periods of auricular fibrillation of varying rate—though the fibrillation has been kept in check—as well as many pulmonary attacks. I am convinced that the patients who get severe embarrassment of the right heart easily, are those who give the heart more to do than it is capable of. A stenosis, in which there have been no progressive changes in the valve for years, may go on causing a slow hypertrophy of the left ventricle without practically any great strain being thrown on the right heart. Certainly, in time the right heart has to pay the penalty; but this may not be for very many years, provided adequate care is taken and suitable treatment adopted. The heart increases specially to the left, when no cicatrization of the valve is going on.

With a break in compensation, the tricuspid becomes relatively incompetent—the safety valve of mitral stenosis. When the heart is restored to its previous normal, the tricuspid insufficiency ceases. Systolic bruits may develop in the mitral region and at the mitral valve under the same circumstances; these also clear up on restoring the heart to a normal rate. They are dealt with farther on.

In uncompensated stenosis, the “rest power” (Mackenzie) of the heart is at a very low ebb; on the restoration of compensation, the rest power is better, probably, than in most other compensated cardiac lesions—provided always that there is not extensive muscular change.

Mitral stenosis is only too often progressive; on the other hand, it may remain stationary, so far as the actual valve is concerned, for many years. The latter condition is a favourable prognostic sign. The lesion is much more rapidly progressive in childhood. It may be that this is due to the more yielding nature of the structures of the child.

THE PECULIARITIES OF MITRAL STENOSIS.

(a) The murmur may occupy the entire diastole, or only part.

(b) It is crescendo in type, and has been variously described as “rumbling” or “purring.”

(c) It is generally very limited in area—often over only a single bell-space of the stethoscope. It is heard more commonly to the inner side of the apex beat than actually over it.

There is one notable exception, viz., in cases in which the heart muscle is good, but the apex beat is in the axilla— anterior or posterior line—the sounds in the usual position of the apex beat may be practically normal and give no hint whatsoever of mitral disease. But on auscultating the axillary region one may sometimes find there, exactly over the apex beat, the typical crescendo murmur and the typical first sound of mitral stenosis. One has seen mitral stenosis completely overlooked, and the heart regarded as free from valvular trouble, on account of the fact that in the usual region of the apex beat the sounds have been normal, or, at least, free from murmurs. Auscultation of the axillary region would have obviated this. This “axillary” bruit of stenosis is commonly long, markedly purring, and fairly gentle; the first sound has the typical “snap,” but in this position it is generally of a more gentle and less marked nature, and the “shock” is not so great. Rarely, the murmur of mitral stenosis has been heard over the greater part of the præcordia; but it is essentially a bruit of limited area and narrow conductivity.

(d) Unlike a mitral systolic bruit, a persistent presystolic murmur denotes the absolute certainty of organic valvular disease.

(e) A well-marked bruit is generally a good sign, though the prognosis may be relatively good with a murmur which is far from loud, especially where the bruit has remained unaltered over a period of years.

(f) If no further narrowing of the valve takes place, the bruit does not change much, and may remain the same for many years. Remaining stationary for years shows that no further change is going on; with further change a diastolic bruit appears.

(g) One may have a systolic bruit due to mitral stenosis. The murmur begins after the first sound and runs up to the second sound in a crescendo nature—a systolic crescendo bruit.

(h) If the condition is advancing, the presystolic vanishes, and a diminuendo diastolic mitral murmur appears. There may be a continuous murmur—the diminuendo running up into the crescendo.

(i) In periods of moderately broken down compensation, a

mitral systolic murmur frequently appears in the mitral area, and the original presystolic murmur may remain as before, viz., heard over the apex beat only, which may be in the axilla. This systolic murmur disappears when the heart is again controlled.

(j) The ordinary presystolic murmur is more marked when the muscular contraction is good.

(k) The presystolic murmur commonly disappears—though not necessarily—on the advent of auricular fibrillation or of cardiac failure, a systolic bruit taking its place. Whether it disappears or not depends on the degree of broken compensation, or on the rate of the irregular contractions getting through to the ventricle. Unless the fibrillation is markedly affecting the ventricular rate, the presystolic murmur may be clearly defined; the more rapid the ventricular rate, secondary to the fibrillating auricle, the less one can make out of the presystolic murmur.

(l) Flint's murmur is a presystolic murmur heard in the mitral region in some cases of aortic regurgitation. It is a spurious mitral presystolic bruit. It may be distinguished from the true murmur of mitral stenosis by the following points:—

1. Its inconstancy: it is not always present.
2. It occurs in association with aortic reflux only.
3. It does not carry with it the characteristic first sound accompanying mitral stenosis.
4. Reduplication or accentuation of the second pulmonary sound are absent.

(m) In certain cases, when the heart is acting very rapidly, a diastolic bruit is commonly heard in the area where an aortic diastolic bruit is often best heard, viz., midway between the mitral area and the aortic cartilage. In cases seen for the first time, one must be careful not to put this bruit down to regurgitant aortic cusps. When the heart slows down, it will often be found that the bruit was of mitral origin, and did not emanate from the aortic valve at all.

THE CARDIAC SOUNDS IN MITRAL STENOSIS.

(a) The first sound is typical; it is short, sharp, and accentuated, and the murmur runs right up to and ends in

it. It has a distinct "snap," and conveys a sense of shock—not unlike the shock of the second aortic sound in some types of aortic aneurism.

(b) Reduplication or accentuation of the pulmonary second sound is almost invariable. A marked weakening in an accentuation previously present is indicative of a loss of cardiac energy. Reduplication is sometimes very marked just to the right of the apex.

(c) Although the bruit may have completely vanished, the typical first sound often persists, and the lesion may sometimes be diagnosed by the characteristics of this sound alone.

(d) The second sound may be diminished or even completely absent at the apex. Absence of this sound is not a good prognostic sign.

(e) The sounds may be normal in the region just within the usual apex beat area; in this event, the bruit may be found in a limited area generally over the apex beat—in one of the axillary lines. This may be very misleading, unless the region of the axillary lines be auscultated.

THE THRILL IN MITRAL STENOSIS.

This is presystolic in time, and is very characteristic. It may be palpated, even before the murmur has made a definite appearance. It is most marked during the expiratory phase and when the chest is fully deflated. At times, it is so marked as to go right up the arm from the hand palpating it. By this thrill alone the lesion may be diagnosed. The longer the duration of the thrill is, the greater the narrowing of the orifice. With a quick ventricular rate it may in great part, or even entirely, vanish, to return when the heart is controlled and compensation is established. Its reappearance is one of the first signs of improvement.

AURICULAR FIBRILLATION.

Much has been written on this subject of late years; a recapitulation of a few facts connected with it may serve to refresh the memory.

It is associated mostly with mitral stenosis, and is rarely found under 16 years of age, though mitral stenosis is any-

thing but rare at this age. It is found more in men, on account of the greater number of cases which fall under the non-rheumatic group in this sex. In the rheumatic group, the proportion is about equal (Lewis).^{*} From 60 to 70 per cent. of cases of heart failure have been found to be due to auricular fibrillation, and Lewis states that 50 per cent. of auricular fibrillation cases in his series showed mitral stenosis as the lesion.

The pulse is irregularly irregular; the beats tumble along anyhow. Now there are a few steady regular beats; the next batch comes along almost tumbling one over the other, as if one were in a hurry to get past the other. They are of all strengths, of all rates, and of all volumes, some full and strong, others scarcely strong or full enough to be felt. Many beats never reach the radials. Usually the rate is fast, but auricular fibrillation may be associated with a slow pulse. The greater the exertion and the greater the cardiac rate, the more marked the fibrillation. This is in strong contradistinction to premature systoles (the old "extra systoles"), which tend to disappear as the heart quickens.

The subjective signs are shortness of breath, palpitation, and a fluttering sensation in the chest. The signs are practically those of a valvular lesion. If further diagnostic proof is required, tracings and electrocardiograms should be taken. In tracings of the jugular vein the auricular wave is absent, and in an electrocardiogram the signs of an auricular systole are missing.

PROGNOSIS.

It may be said at once that the prognosis in the child is worse than in the adult. In children, the lesion is more rapidly progressive; and few children with a stenosed mitral valve reach maturity.

Slow, regular action of the heart is a good prognostic sign, and so are normal cardiac sounds heard to the right of the apex beat.

A certain amount of regurgitation along with the stenosis improves the prognosis as regards the length of expectation of life.

A normally placed apex beat also helps the prognostic

^{*} Clinical Disorders of the Heart Beat.

outlook : it signifies that there are reserve forces which may yet be called upon.

Absence of the signs of enlargement of or strain on the right heart is also of good prognostic significance.

An important circumstance, on which we may base an opinion, is the amount of work a given heart will have to perform. The woman who has to work hard for her living—probably bearing children at the same time—has an incomparably poorer chance than the lady of ease.

A very important element in the prognosis is whether or not compensation has ever been broken down ; one breakdown tends to another, and makes the prognosis correspondingly worse.

Entire absence of auricular fibrillation promises, generally, a better outlook, for fibrillation can only add to an already embarrassed action. Once the auricles begin to fibrillate, the chances are that they will continue to do so more or less, thus necessitating more or less constant digitalis medication. Any febrile attack or intercurrent illness, any nervous strain, dyspepsia, or over-exertion is going to bring back, in the great majority of cases, a recurrence of the fibrillation.

A quick response to digitalis, and a maintained improvement therefrom over a considerable period of time after the medication, help the prognosis materially as regards the length of life.

The amount the heart is capable of without showing signs of being taxed is also of great prognostic value.

A lesion, which has been known for years to have remained stationary, is of favourable prognostic import. With care, the lesion may remain *in statu quo* for many years.

When rapid auricular fibrillation is present, and a powerful digitalis reaction has been produced by the exhibition of from 30 to 40 six-hourly doses of 15 minims of a standardized tincture of digitalis, if the heart rate on the withdrawal of the drug relapses from 60 to 90 or 100 beats per minute in a few days, the patient meantime being kept at rest in bed, we are justified in giving a very guarded prognosis indeed. The indication is that the reserve forces have already been in great part used up.

Faintness of the second sound in the mitral area also

justifies a very guarded prognosis ; entire absence, a more guarded prognosis still.

A long rumbling bruit, indicative of very considerable narrowing, tends to make the prognosis less hopeful ; and yet some of these cases, if great care is taken, go on for many years ; these more favourable cases are, however, examples of stationary lesions.

The possibility of cerebral embolism, hæmoptysis, and the onset of auricular fibrillation has to be considered.

At best the prognosis in mitral stenosis is uncertain, but there are many indications which help one to come to an approximately correct conclusion. Yet there are many surprises. Seven years ago, I saw a girl of 18, who at the time had a steady pulse rate of 130 to 140. She had profound general œdema, the abdomen was tense from ascites, and both pleural cavities contained large quantities of fluid. She was in a severe grade of orthopnœa, and almost purple with cyanosis. One would have thought the outlook grave enough—especially as regards further early failures in compensation. Without either paracentesis thoracis or abdominis, the condition, under strong digitalis medication, completely righted itself. She has been earning her living ever since, and has gone about normally during these seven years without, apparently, a single symptom of any importance.

Another patient, seen at the same time, aged 40, had had mitral stenosis for many years. When I saw her first, she had auricular fibrillation, an apex beat between the anterior and posterior axillary lines, and slight œdema of the feet and ankles. Though able to have plenty of physical ease, in these seven years she has successfully weathered long periods of worry, stress and strain, and has had two or three severe attacks of bronchitis and pulmonary congestion each year. Each attack is accompanied by copious, rusty, and sometimes very bloody, sputum, and a high temperature for a week. Yet to-day the apex beat is in the same position, the pulse is kept at from 64 to 74 with small doses of digitalis off and on, and the bruit is the same now as it was seven years ago—a long, gently purring bruit, heard over the displaced apex only. Off and on the mitral and tricuspid have both become temporarily incompetent, and occasionally the liver has reached an uncomfortable

size ; yet this patient is carrying on a large and responsible organization.

TREATMENT.

The treatment of mitral stenosis practically resolves itself into either—

- (a) restoring compensation when that is broken down ;
- (b) regulating auricular fibrillation ; or
- (c) treating both conditions, when these are present together.

The treatment of one is practically the treatment of the other, and, as much has already been written on this subject, no more than brief mention is called for.

For all practical purposes, digitalis is the only drug one need consider. The most reliable preparation is the tincture. In every case this ought to be standardized ; personally, I invariably use Parke, Davis, & Co.'s standardized tincture, for I have found this the most reliable preparation there is. In fibrillation with more or less cardiac failure, 15 minims should be given every six hours day and night, until either the pulse comes down to the region of 70, or distinct nausea, headache, or retching supervene. It may be given even four-hourly ; or 20 minims, or even 30, may be given every six hours. The ideal to be aimed at is to get a clear digitalis reaction. When this is obtained, which is evinced by the pulse dropping to from 64 to 70, the drug should immediately be withdrawn. When the pulse begins to rise again, the same doses should be employed, but fewer of them ; moreover, an endeavour should be made to strike the requisite amount of digitalis necessary to keep the ventricular rate in the region of 70. My usual practice, having once obtained a strong digitalis reaction with the tincture, is to prescribe one granule of $\frac{1}{240}$ th of a grain of Nativelle's digitalin every 12 or 24 hours, when the pulse begins to rise to the region of 80 or 90 beats per minute. These granules are easily taken ; they are potent and constant in action. One may have to be taken daily, or one or two, for three or more days. The patient soon learns how many are required to keep the heart in its most efficient working condition.

If the condition is very acute, a rapid reaction may be

obtained by giving $\frac{1}{200}$ th of a grain of strophanthin intravenously. This will often reduce the ventricular frequency from 130 or more to 72 or so within ten minutes. It may be repeated in one or two days, or may be followed on by digitalis. Coupled beats are a sign that the administration of digitalis has been carried to the limit of safety. A sense of constriction round the chest, and the inclination to draw occasional long breaths, are also signs that the administration is being pushed far enough.

If the blood-pressure is very low, and the general state poor, an ampoule of 1 c.c. of pituitrin may be injected along with the strophanthin. Five minims of liq. strychninæ by the mouth, or, better still, $\frac{1}{60}$ th to $\frac{1}{30}$ th of a grain of strychnine hypodermically, every four or six hours, are useful adjuncts, for the strychnine stimulates the respiratory centre, and so helps to relieve the breathing.

Restless nights and difficult respiration are best relieved by the hypodermic injection of $\frac{1}{4}$ th to $\frac{1}{6}$ th of a grain of morphia combined with $\frac{1}{240}$ th to $\frac{1}{150}$ th of a grain of atropine sulphate.

The administration of digitalis will almost invariably greatly increase the diminished urinary flow; if not, 10 grains of theobrominæ et sodii salicylas, given every four hours, will often act as a charm. This drug also possesses considerable cardiac tonic properties. Theocin sodium acetate, 3 grains three times daily, dissolved in water and freely diluted, will sometimes act when the former preparation falls short of expectation. It is, however, liable to produce nausea; small doses of menthol will sometimes obviate this.

Sleeplessness is best combatted by giving either ʒi or ʒii of paraldehyde or half an ounce of chlorobrom. Veronal, medinal, and allied preparations, are absolutely inadmissible. Half an ounce of brandy is, at times, more efficacious than any of the ordinary hypnotics.



GENERALIZED ANASARCA WITH ASCITES, COMPLICATING GRAVES'S DISEASE.

By HOWARD VINCENT MITCHELL, M.R.C.S., L.R.C.P.,

With a Note by H. C. CAMERON, M.D., F.R.C.P.

THE following are the notes of a case of severe and generalized anasarca, occurring as a complication in Graves's disease of unusual severity, unaccompanied by evidence of nephritis or considerable heart failure, and relieved by the prescription of a "salt-free" diet.

Mrs. O.'s health had always been good until the summer of 1909, when she was 28 years of age. She had been married for three years, but there were no children. Her weight was 11 stone 4 pounds. The first symptoms noticed were fatigue on exertion, nervousness, and a gradual loss of weight. In June, 1910, the weight had fallen to 10 stone, and although there was as yet no swelling of the thyroid gland, a diagnosis of incipient Graves's disease was then first made. From that time onwards, the disease progressed with unusual rapidity, reaching, perhaps, its extreme degree in January, 1913, when some dropsy of the legs began to appear. At that time all the symptoms of hyperthyroidism were very marked. The exophthalmos and the enlargement of the thyroid were extreme. Tremor, palpitation, restlessness, and sweating persisted without abatement for many months. Profuse diarrhœa was especially troublesome and difficult to relieve. The temperature for many months varied from 100° F. to 103° or 104° F.; the pulse rate was from 120 to 140. The weight fell to 5 stone 2 pounds, a fall of over 50 per cent. A variety of treatment was tried, but without marked effect; thyroidectomy, radium, X-rays, etc. Throughout this period she was confined to bed in different nursing homes, and the private wards of hospitals, although for a time open air treatment was tried. In April, 1913, the dropsy first became severe, and ascites developed sufficiently to demand paracentesis. Twelve pints of serous fluid were removed, but

the process had to be repeated on three further occasions, before she was removed with great difficulty to a nursing home at Clacton-on-Sea, and came under my care.

At this time, the condition was extremely grave, so much so that recovery seemed unlikely. The persistent anasarca had become the most pressing symptom. The arms, legs, face, abdominal parietes, and lumbar region were swollen almost to the maximum extent, and pitted readily on pressure. The œdematous condition of the lungs caused a constant cough and expectoration, which added much to her sufferings. The most urgent and striking symptom, however, was the persistence and rapidity with which the dropsical fluid collected in the peritoneal cavity. From the time of her arrival in Clacton until February, 1914 (a period of seven months), paracentesis of the abdomen was performed nine times, while fluid was drawn off from the subcutaneous tissues of the legs on two other occasions. The amount withdrawn from the peritoneal cavity on each occasion averaged 10 pints. In addition, an attempt was made to promote diuresis by a variety of diuretics, especially theocin and digitalis. Throughout, the urine was passed in fair amount, was of normal specific gravity, and contained no albumen or sugar.

In February, 1914, Dr. Cameron saw the patient in consultation with me. By this time the symptoms of hyperthyroidism had to some extent abated, for although the exophthalmos, goitre, tremor, and palpitation were still very marked, the pyrexia had almost disappeared, the pulse had become slower, except when the patient was excited, and the diarrhœa and sweating had become much less. The extreme degree of the dropsy, however, urgently called for relief. At Dr. Cameron's suggestion, a salt-free diet was ordered. Meat, vegetables, bread, etc., were all cooked without the addition of sodium chloride. The effect was almost immediately apparent in the decline of the dropsical accumulations. Paracentesis was performed on two further occasions, but the amount had fallen to six pints and after the second the fluid did not again accumulate in the peritoneal cavity, and the œdema in the subcutaneous tissues slowly and steadily declined. In August, 1914, six months after the salt-free diet had been begun, the dropsy had almost completely

disappeared. For a week, at that time, the diet was omitted, and salt was allowed in moderation. The œdema, however, at once reappeared, and in consequence the weight increased during the week by seven pounds. On resuming the salt-free diet it again disappeared. Latterly, massage was helpful in assisting in the general improvement in the nutrition of all the tissues which now began to manifest itself. Whereas, in February, 1914, the tissues, although swollen with dropsy, showed the most severe degree of atrophy, in August, 1914, the general nutrition of the whole body was in every way satisfactory, and the weight in spite of the disappearance of the dropsy had increased within the same period from 6 stone 13 pounds to 10 stone 6 pounds.

When last seen, May, 1915, the patient's condition was highly satisfactory. She had returned to her usual habit of life, and was able to take walking exercise of one or two miles daily. The exophthalmos and the goitre were still considerable, but the other symptoms caused little inconvenience.

NOTE BY H. C. CAMERON, M.D., F.R.C.P.

Dropsy and ascites have for a long time been recognized as occasionally accompanying severe cases of Graves's disease. Nevertheless, it must be very rare to find so severe a degree of anasarca persisting for many months as in Dr. Mitchell's case. In the "System of Medicine," edited by Sir Clifford Allbutt, Dr. Hector Mackenzie writes that general œdema may occasionally be one of the main features of the disease in an early stage, and that there may be effusions into the serous cavities as well as anasarca—a statement, the truth of which is borne out by this case, but which I do not find repeated in a number of other text-books consulted. Throughout his writings on this subject, however, Dr. Mackenzie appears to have paid special attention to this symptom. Trousseau quotes the case of a lady under his care who suffered for a short time from dropsy and ascites, but he makes no general statement on the subject. An interesting, though very short paper on dropsy in Graves's disease was published by Dr. Maude, of Westerham, in *THE PRACTITIONER* for December, 1891, who quotes from a Paris thesis by Millard, entitled, "Les œdèmes dans la

maladie de Basedow," in which ten cases had been collected.

In the references, scattered through the literature, to the association of œdema and Graves's disease, it is obvious that more than one form of œdema has been noted and described.

(1) The œdema may be characterized, as ephemeral, asymmetrical in distribution, often confined to one or both eyelids, sometimes associated with urticaria—descriptions which suggest a nervous or vasomotor origin, quite in keeping with other symptoms of the disease.

(2) The œdema is sometimes described as pitting with difficulty on pressure and of unusually solid consistence. In such cases, it would appear to resemble the swelling of the subcutaneous tissues met with in myxœdema.

(3) Lastly, but much more rarely, we meet with cases of general œdema comparable to that in Dr. Mitchell's case.

In this case at least, it was a matter of some difficulty to determine the exact cause of the profound anasarca and ascites. That the urine throughout remained free from albumen eliminated the possibility of nephritis. Although the action of the heart was rapid and excitable, its behaviour was not different from what is usual in cases of exophthalmic goitre, which show no trace of dropsy. The flow of urine throughout was comparatively copious, and there were no other signs of marked heart failure. An electrocardiogram, which Dr. Hunt was good enough to take, showed no marked abnormality.

At the time of my first examination, the condition reminded me most forcibly of the generalized œdema which may suddenly appear in emaciated infants, whose tissues have been depleted of salts by their rapid excretion during severe diarrhoea and vomiting. Such infants at the time of the recovery from the worst symptoms, at the time when food with a high content of salts is again beginning to be absorbed in considerable amounts, may suddenly show the development of severe dropsy, and the degree of the dropsy would appear to be proportionate to the completeness with which the tissues had formerly been depleted of water.

In this case, the body weight had fallen during the height of the disturbance, from 11 stone 4 pounds to 5 stone 2 pounds

and there had been very profuse and intractable diarrhoea. The onset of the œdema and its further spread coincided with a decline in the severity of the symptoms of hyperthyroidism, and with a marked improvement in the appetite. It seemed to me likely that the œdema was due to the sudden retention and accumulation of salt in the body, the result of the recovery of appetite, and the increased consumption of salt at a time when the excretion was still unable to keep pace with this increased demand. It would appear that we had to deal with a failure of the body to excrete sodium chloride, comparable in kind and extent with that which constantly accompanies chronic tubal nephritis, and that we had the opportunity of observing this symptom unaccompanied by the other usual results of nephritis. The readiness with which the case responded to the reduction of the intake of sodium chloride favours this view. During the gradual disappearance of the œdema, it was not possible to detect any change in the cardiac condition.



TREATMENT OF SEPTIC WOUNDS BY SILVER NITRATE.

BY W. J. S. INGRAM, M.B., CAPTAIN, R.A.M.C. (S.R.).

Late House Surgeon, Children's Hospital, Sheffield, and Royal Infirmary, Aberdeen.

FOR the last few weeks I have had charge of the surgical ward—100 beds—in a field ambulance, and have treated many cases of septic wounds and blisters. These consisted of gunshot and shrapnel wounds, accidental wounds caused by hammers, picks, and entrenching tools, and punctures from thorns, etc., the last being the commonest. Most of the accidental wounds and blisters, caused by punctures, were of some duration, and had not been attended to; consequently, they had become advanced and, when burst, in a filthy condition, often accompanied by cellulitis. Lack of attention was due to the fact that the patients had been in the trenches, where the regimental medical officer had no means of treating them—shortage of water, dressings, etc. All these wounds were superficial, for deep wounds must be evacuated to a base hospital.

At first, I treated them by wide incisions, thoroughly cleaning with potassium permanganate (1-40) or perchloride of mercury (1-4,000), and by application of fomentations three times a day. I noticed—

- (1) That healing was very slow;
- (2) That amount of hypergranulation tissue was very excessive.

I then tried the application of 5 per cent. iodine solution, after thoroughly cleaning the resulting ulcer or wound with potassium permanganate or perchloride of mercury. If there was much foreign material or grease, I fomented for 24 hours before applying the iodine. As the results were not satisfactory, I tried the effect of a 10 per cent. iodine solution, but still the results were not very satisfactory.

Next, I tried silver nitrate—the ordinary lunar caustic.

Removing the foreign material by fomentations, if necessary, I applied silver nitrate over the bed of the ulcer and along any sinus, paying particular attention to thoroughness of application along the course of the sinus. For the next 24 hours, I put on an ordinary dry dressing of biniodide gauze. After 24 hours, I found that the bed of the ulcer was covered with a brownish, slimy slough, and, in some cases, the margin of the ulcer was inflamed and angry-looking. For the next 24 hours, I applied fomentations three times, and, as the result, found that the marginal inflammation had gone or largely subsided, the slough had separated, and the bed of the ulcer was covered with clean, healthy, granulation tissue. Healing then proceeded rapidly.

Later, I tried fomentations after the application of the silver nitrate, and I found that, in most cases, the slough separated during the first 24 hours, the same healthy granulation tissue resulting.

In deep wounds or ulcers, or where hypergranulation tissue was very abundant, two or three applications of silver nitrate was necessary, allowing an interval of three days between each application.

So successful was this method, that I retained in my ward many cases of septic wounds or blisters of considerable size and depth, provided that, in the case of wounds, the surrounding tissues were not much damaged; the same good results followed. Previously, these cases had been evacuated to a base hospital.

I have written this short note in the hope that other medical officers in field ambulances may attempt this treatment in similar cases, and so relieve, to a certain extent, pressure in the base hospitals.



BRITISH HEALTH RESORTS.

I. CHELTENHAM.—REVIVAL OF THE SPA.

ANY attempt to renew interest in our home Spas should prove particularly opportune at this moment, when the Continental places of resort, particularly those of Germany, are closed to visitors. For some time past, local efforts have been directed to reviving public interest in Cheltenham as a place where a "cure" may be effected by drinking the natural mineral waters, combined with treatment usually adjunct to water drinking, *e.g.*, by baths of various sorts, massage, and electric currents. The success of these efforts hitherto has not been very marked, but during the last year a committee, formed of members of the commercial class, has been working in conjunction with the Cheltenham Corporation in endeavouring to utilize this opportunity, and their joint efforts have been successful in attracting a considerable number of visitors. Dowsing radiant heat, and electric apparatus were added to the bathing installation in the course of last year, and practically any kind of treatment obtainable at any Spa, home or foreign, is now provided at Cheltenham, according to the order of the physician, the baths of Nauheim, Droitwich, etc., being imitated with something approaching exactness. A comfortable lounge, well supplied with newspapers, has been provided for the gratuitous use of visitors to the Spa, and selections of music are played there in the early morning, and again in the forenoon and afternoon.

The town is a very pleasant one, and the surrounding country is admirably suited for excursions. Motor drives into the Cotswold Hills, or through the Severn Vale, with the object of visiting the several cathedrals and abbeys, and the quaint villages situated around, or to attend the meets of the foxhounds, are now the order of every day, and may be indulged in at very small expense—all, doubtless, materially assisting the benefits to be derived by a sojourn in

Cheltenham.

The anniversary of the initiation of the new effort, which came round on October 29th, was marked by a large and influential gathering at the baths and in the Cheltenham Town Hall. At the meeting in the afternoon, the Earl St. Aldwyn presided, supported by numerous influential persons of the county of Gloucester, the principals of the Cheltenham Colleges, many members of the local medical profession, and others.

Lord St. Aldwyn, in an opening speech of some length, referred to the former position of Cheltenham as perhaps the leading watering-place and cure-place in the country, and considered it was fashion rather than the virtues of the place and its waters that had changed. Amongst the 8,000 persons, who had drunk the Cheltenham waters during the last season, was an intimate friend of his, who for many years had been in the habit of seeking his annual cure at Marienbad, and he suggested that this example might well become common experience. Although the Cheltenham waters could not be thought good for every complaint, he believed they were good for some diseases, such as those that had made the fortunes of Marienbad and Kissengen. In his further remarks, the noble Earl expressed the opinion that the conditions at Cheltenham were as suitable to a cure as those at any German Spa, provided the visitors to Cheltenham acted in the same way as when in Germany, by rising early in the morning and giving strict attention to the directions of the medical attendant in matters of diet, exercise, and what else might be ordered.

Sir James F. Goodhart, who has for a long time made a study of English Spas, then gave an address of great interest. He endorsed the remarks of the Chairman in regard to the suitability of the town for a health resort, and thought the climate particularly good for winter resort. The air of the Cotswold Hills, that overshadow the town, was of the finest in England, and he had sent many patients to breathe it. He thought that if Cheltenham had been on the Continent, it would long ago have become a second Carlsbad or Marienbad. Perhaps the hotel accommodation at Cheltenham required improvement, but as to Spa treatment he considered it appropriate to those cases in which the physician catches the

first glimpse of beginning disease, and that in such cases it will often afford the stitch in time.

Dr. Arthur Latham, of London, being unable to attend as promised, sent a paper which was read to the meeting by Dr. Cardew.

Dr. Latham said he had become acquainted with Cheltenham. It is a beautiful town possessing an excellent climate with relatively cool summers and mild winters, and was especially well suited for certain persons, certain complaints, and for the aged. He considered the setting a perfect one for a health resort, and that the Spa was amply in evidence in the abundance and variety of its mineral waters. He thought the therapeutic action of these waters required further investigation to put their use upon a scientific basis, but was satisfied of the great value of the waters. What was required was a business-like development of the Spa. He concluded by stating that Cheltenham had a natural asset in the Spa, and that it was the duty of the town to seize the present unique opportunity for developing it.

The discussion was continued by Mr. J. T. Agg-Gardner, M.P. for Cheltenham, Dr. R. Kirkland, Dr. J. H. Garrett, Dr. J. Howell and others.



BRITISH HEALTH RESORTS.

2. BATH.—RE-OPENING OF THE PUMP-ROOM.

THE Re-opening of the Bath Pump-room, on November 8th, was of national interest, in spite of the world-wide war. The restoration has been excellently carried out, not by removing the old and replacing by the new, but by renewing only the structure which was scarred and worn by use; otherwise, the far-famed room remains as it was when an earlier George was King. Externally, the classical façade, its Corinthian columns scarce touched by the footprint of time or the hand of man, still tells the scholar that water is best, and incidentally suggests the chief use of the building. Internally, we see to-day the same scene, the same routine, that Beau Nash saw in an earlier Pump-room when Anne was queen. His statue smiles upon the minstrel gallery and oaken floor, and reminds us that for 50 years he was King of Bath. Near him is the clock, presented by Tompion, which Nash glanced at before going to the dancing in the Grove, or before taking tea at Sally Lunn's in Lilliput Alley. And now, though afternoon business is as usual, Sally has given place to others.

Fashions change, all things pass, but Bath remains. Restoration has a somewhat sinister meaning to art lovers, but in the pump-room spring cleaning would be the more accurate term, for the old furniture reminiscent of the 18th century remains. In the time of Nash, it is probable that his pump-room was furnished in Queen Anne style, for it was the age of walnut, but whether he replaced it with what is now the old, but was then the new-fangled Chippendale, history does not relate. The pump-room concerts, an older institution than Nash, have soothed rheumatic pains for more than 200 years. Has any other orchestra, we wonder, a longer pedigree? And now, on the day of its re-opening, the city is proud of the fact that nowhere on the Continent is there a pump-room that can vie with that of Bath, nowhere is there a more historic or a more comfortable health lounge.

The ancient story of Bath is too well known to need

repetition, but it may be recalled that there are four principal periods in her history :—

The Traditional Period of King Bladud, 800 years before the Christian era, when the curative value of the waters was first recognized and utilized.

The Period of Roman Culture, when Cæsar's legions came for cure and recreation.

The Romantic Period of Beau Nash when dainty ladies, poets and politicians, soldiers and sailors were attracted by its beauty and its fame.

The Period of the present Renaissance, when it is acknowledged that the value of the "waters of the sun" is founded upon scientific truth.

But through all the long vista of centuries, Bath has never swerved from the principle that the 500,000 gallons of healing waters, which day after day for countless ages have found their way to the surface, are the priceless heritage of the nation, and that the mayor and citizens are the trustees rather than the owners. The traditions which cluster round the epic oolite of the Roman remains, the history which enchants the imagination, are part and parcel of our Empire's story. The commercial side, that is the market value of the waters, has consequently always been dominated by higher considerations, and it may surprise some to know that no direct relief to the rates arises. In this Limited Liability Company, the patients are the preferred shareholders who receive the dividends in relieved pains and released joints. There was once a Bath citizen who, Pope tells us, did good by stealth and blushed to find it fame. Perchance he has many blushing descendants in Bladud's city to-day.

The Royal Mineral Water Hospital was erected in the first half of the 18th century, and the local altruism may be gathered from an inscription on a Bath token, issued by the hospital 100 years ago, which reads: "Open to people of all countries, Bath alone excepted." At the close of the Napoleonic wars, the wards were thronged with soldiers and marines wounded in the defence of the freedom of the world; and again, in the present day, history repeats itself. From the foundation of the hospital to the present time

nearly 100,000 men, women and children from all parts of the world have been admitted without payment and without subscribers' letters.

How is Bath living up to its reputation in the present war? Two outstanding personalities have led the way. The mayor has initiated and organized civic philanthropy of every description; Lady de Blaquièrè has breathed the spirit of vitality into empty houses, and lo! hospitals have appeared. To officers and men alike the whole Bathing Establishment is freely thrown open, and 3,000 baths have been gratuitously administered. A comfortable home rather than hospital has been opened for officers in Marlborough Buildings. Into this 64 have been admitted since the beginning of the war, and others, non-resident, have been attended to. At Lansdown a Red Cross hospital for non-commissioned officers and men, with 80 beds, has already received 350 in-patients, and there is, too, a large out-patient department. Near by, Lady Strathcona, a daughter of one of Bath's famous freemen, has furnished a hospital complete in every respect. At Newton Park, the Countess Temple is the presiding genius of a St. John Voluntary Aid Hospital of 35 beds, into which 125 patients have been admitted in the last 12 months. At the Mineral Water Hospital, 725 in-patients have been received, and the Royal United Hospital has placed 50 beds at the service of the wounded. The Wesleyan community have provided 40 beds in the Sanatorium of Kinswood School as a Voluntary Aid Hospital, and have taken 90 patients in the last six months, in addition to a number of Belgian soldiers who had previously been admitted at the request of the mayor. And now another large military hospital of 500 beds is nearly completed. But the hand of gratitude and duty is not yet stayed, and it is anticipated that the total contribution of beds at the disposal of the Admiralty and War Office will not be far short of 1,000.

Practical Notes.

TREATMENT OF RINGWORM.

For superficial herpes tonsurans, Salinger advises painting the spot, at least twice a day, carefully with tincture of iodine. The use of the following ointment will bring about a result more quickly:—

℞	Acidi Salicylici	-	-	-	-	3ij.
	β-Naphtholis	-	-	-	-	3iiss.
	Resorcini	-	-	-	-	3i.
	Adipis lanæ	-	-	-	-	ad 3iiij.

Misce. Fiat unguentum.

A thick layer of this ointment is spread on gauze and fixed in place with a bandage. A fresh application is made in 24 hours, and after another 24 hours the skin will have blistered. The blister is emptied, and dressed with an inert powder, like talc.

Iodine is of no service in the deeper going affections. For these the ointment is mixed with—

℞	Acidi Salicylici	-	-	-	-	gr. xlv.
	Olei Rusci	-	-	-	-	3ij.
	Olei Olivæ	-	-	-	-	ad 3iiij.

The affected area is washed with a $\frac{1}{2000}$ solution of perchloride of mercury in spirit, and the mixture of ointments is then applied. This is repeated daily, and it is claimed that it will cure the most obstinate case without epilation being necessary.—(*Correspond. Bl. f. Schweizer Aertze*, 18 September, 1915.)

FOR CRACKED NIPPLES.

Bardet recommends the use of the following ointment for the relief of this painful condition.

℞.	Mentholis.					
	Stovain.	-	-	-	-	ana gr. viii.
	Zinci oxidi	-	-	-	-	3i.
	Tincturæ Benzoini	-	-	-	-	3iiss.
	Liquoris Rosæ dulcis	-	-	-	-	q.s.
	Paraffini mollis	-	-	-	-	3iiss.
	Olei theobromatis	-	-	-	-	3i.

Misce. Fiat unguentum.

—(*Nouveaux Remèdes.*)

TREATMENT OF MOIST ECZEMA.

According to Unna, heavy dressings of absorbent wool or gauze are not at all necessary, even on extensive areas of the disease on the head or trunk. He advises the use of the following ointment, which will dry

well into the skin:—

℞ Sulphuris præcipitati
 Calcii carbonatis - - - ana ℥i.
 Unguenti Zinci - - - - ℥i.
 Misce. Fiat pasta.

This should be applied frequently, but in small quantities at a time. A sensitive region like the face, neck, and groin should be damped with water before the paste is applied.

For true eczema, in which there is a coccal infection of the skin, boric acid ointment, though much used, is not effective. It should be made into a paste as follows:—

℞ Zinci oxidi
 Sulphuris præcipitati
 Calcii carbonatis - - - ana ℥i.
 Unguenti Acidi Borici - - - - ℥i.
 Misce. Fiat pasta.

The addition of 1 per cent. of carbolic acid or creosote is often an advantage in allaying the itching and acting as a germicide.—(*New York Med. Journ.*, 9 October, 1915.)

TREATMENT OF PALPITATION IN RHEUMATISM.

Plicque recommends the use of the following ointment, applied over the præcordium, as well as the internal administration of salicylate:—

℞ Sodii salicylatis - - - - gr. lxxv.
 Iodoformi - - - - ℥ss.
 Extracti Hyoscyami - - - - gr. xv.
 Paraffini mollis - - - - ℥v.
 Misce. Fiat unguentum.

After the ointment has been applied it is covered over with flannel or a layer of absorbent wool.

In chronic rheumatism, iodide of potash should be given internally instead of salicylate of soda.—(*Nouveaux Remèdes*.)

TREATMENT OF CORNS.

It is always wise to remember the dangers of surgical removal, if not carried out with strict aseptic precautions, and that the removal is not always complete. The surface of the corn should be scratched off carefully with the finger-nail every day, after soaking the foot in hot water for a quarter of an hour. External applications will do the rest. Of these, the following have been found to be the most efficacious:—

1. Painting with perchloride of iron—the official solution—or with tincture of iodine. Neither causes any pain, but both stain a good deal. The corn is carefully covered up, and at the end of from eight to ten days can be detached by slightly scratching.

Soft soap, mixed with alcohol, and spread on a piece of soft flannel, may be used as a dressing to be kept on all night.

Acetic and nitric acids are too caustic, but a very simple method is the application of citric acid by bandaging a slice of lemon in place every

night.

2. Salicylic collodion, 1 in 10, should be applied daily; a stronger solution often causes somewhat sharp pain. Lactic acid may be combined with this—

℞	Acidi Salicylici	-	-	-	-	℥j.
	Extracti Cannabis Indicæ	-	-	-	-	℥ij.
	Ætheris	-	-	-	-	℥ss.
	Collodii	-	-	-	-	℥i.

Misce. Fiat pigmentum.

Or,

℞	Acidi Salicylici	-	-	-	-	gr. xlv.
	Acidi Lactici					
	Resorcini	-	-	-	-	ana gr. xx.
	Collodii	-	-	-	-	℥j.

Misce. Fiat pigmentum.

3. Plasters may be used in place of the above applications.

℞	Cupri Subacetatis	-	-	-	-	℥i.
	Olei Terebinthinæ	-	-	-	-	℥iss.
	Ceræ flavæ	-	-	-	-	℥vi.

Misce. Fiat emplastrum.

Or,

℞	Cupri Subacetatis	-	-	-	-	℥i.
	Olei Terebinthinæ	-	-	-	-	℥ii.
	Picis	-	-	-	-	℥ss.
	Ceræ flavæ	-	-	-	-	℥j.

Misce. Fiat emplastrum.

These plasters should be applied every night. The corn gets softened, and is removed by slight scratching. If this should cause a little bleeding, the point must be touched with tincture of iodine.

Soft corns may be treated in the same way, but a better plan is to apply plenty of the following powder:—

℞	Aluminis					
	Acidi Tannici	-	-	-	-	ana gr. xlv.
	Zinci oxidi	-	-	-	-	℥ij.
	Talci	-	-	-	-	℥i.

Misce.

—(*Journ. des Praticiens*, 9 October, 1915.)

TREATMENT OF ZONA.

The vesicles should be powdered with an inert powder, such as talc or dermatol. Starch may be used when the vesicles have dried up, either by itself or mixed with zinc oxide or camphor.

℞	Zinci oxidi	-	-	-	-	℥i.
	Pulveris Amyli	-	-	-	-	℥ss.

Misce. Fiat pulvis.

Or,

℞	Camphoræ	-	-	-	-	℥i.
	Pulveris Amyli	-	-	-	-	℥iss.

Misce. Fiat pulvis.

If there are sharp pains, a 5 per cent. solution of picric acid in ether should be applied night and morning, the area being then well powdered with starch or covered with dry gauze.

Opening the vesicles with a flamed needle, when there is much inflammation, and touching the place with a 1 per cent. solution of methylene blue has been recommended, but it seems sometimes to give rise to obstinate neuralgia. This, however, is very liable to occur in elderly people, independently of the early treatment, when the eruption has cleared off. At this time a useful application is methyl salicylate or algolane (salicyl-dioxy-iso-butyrate of protyle), which is rubbed in night and morning and the part covered up with dry gauze, oiled silk, and absorbent wool. Another application is picric acid collodion, which is painted on night and morning :—

℞	Acidi Picrici	-	-	-	-	-	gr. x.
	Alcoholis						
	Aetheris	-	-	-	-	ana	℥ss.
	Collodii	-	-	-	-	-	℥i.

Misce. Fiat pigmentum.

High-frequency currents will often relieve the pain considerably. Internally, alcohol and coffee must be forbidden, and all fatigue avoided. Analgesic cachets should be given, such as :—

℞	Pyramidon	-	-	-	-	-	gr. v.
	Quininæ hydrobromidi	-	-	-	-	-	gr. iij.

In one cachet.

Or,

℞	Phenazoni						
	Ammonii bromidi	-	-	-	-	ana	gr. iv.
	Cocainæ hydrochloridi	-	-	-	-	-	gr. $\frac{1}{12}$.

In one cachet. Two to be taken, with a half-hour's interval.

Or,

℞	Phenazoni	-	-	-	-	-	gr. viiss.
	Phenacetini	-	-	-	-	-	gr. iss.
	Acetanilidi	-	-	-	-	-	gr. $\frac{3}{4}$.

In one cachet. Two to be taken, with an hour's interval.

Hypodermic injections give relief, whether of plain distilled water, normal saline, or containing an active substance, such as salicylate of soda or scopolamine :—

℞	Sodii salicylatis	-	-	-	-	-	gr. iij.
	Cocainæ hydrochloridi	-	-	-	-	-	gr. $\frac{1}{4}$
	Seri factitii	-	-	-	-	-	℥ xxv.

Or,

℞	Scopolamini hydrobromidi	-	-	-	-	-	gr. $\frac{1}{640}$
	Aquæ destillatæ	-	-	-	-	-	℥ xv.

Injections of morphia, formerly recommended by Dieulafoy, have the disadvantage of leading on to the morphia habit, for the pain is obstinate,

and sometimes recurs for several weeks.—(*Journ. des Praticiens*, 16 October, 1915.)

TREATMENT OF GASTRIC ULCER.

Cohnheim considers that there are two drugs for internal administration, which are of value. These are silver nitrate and bismuth subnitrate. The first is usually given for the acute chlorotic ulcer, and the second in the other forms. The dose of nitrate of silver is half a grain in a wineglassful of water from a quarter to half an hour before meals. One teaspoonful of bismuth is stirred up well in a glassful of warm water, and taken each morning before breakfast, the patient lying on her right side for half an hour afterwards.

If the pain is still not relieved, belladonna must be combined with the bismuth, or an alkali taken one or two hours after food.

℞	Extracti Belladonnæ Sicci	-	-	-	gr. iij—v.
	Magnesii oxidi				
	Sodii bicarbonatis	-	-	-	ana ʒvj.
	Misce.				Fiat pulvis.

“One teaspoonful to be taken one or two hours after meals, two or three times a day.”

℞	Extracti Belladonnæ	-	-	-	gr. iij.
	Bismuthi subnitratis	-	-	-	ʒiv.
	Misce.				

“As much as will cover the point of a knife to be taken after meals.”

For spasm of the pylorus, from half to one wineglassful of olive oil should be taken before breakfast, and one or two teaspoonsfuls before the mid-day and evening meals, or the following:—

℞	Tincturæ Belladonnæ	-	-	-	ʒj—iss.
	Olei Amygdalæ dulcis	-	-	-	ʒj—iss.
	Ovi vitelli	-	-	-	i. vel ii.
	Aquam destill.	-	-	-	ad ʒviiss.
	Misce.				Fiat emulsio.

“One tablespoonful to be taken before meals three times a day.”—*Medical Record*, 11 September, 1915.)



Reviews of Books.

The Biology and Treatment of Venereal Diseases. By J. E. R. McDONAGH, F.R.C.S. London: Harrison and Sons. 25s. net.

It is refreshing in these times, when the modern craze, even in England, is to accept original research work only by other than an Englishman, to find an Englishman who has the courage to endeavour to do it. Mr. McDonagh has been persistent enough to stick to his theories, and to endeavour to prove them by laboratory evidence, with the result that he now stands a possible chance of coming to his own, so far as world's recognition is concerned.

The book before us is divided into two parts, of which the first is devoted to venereal diseases. The opening chapters deal with the author's research work upon the "leucocytozoon syphilidis," which he considers to be the cause of syphilis. It is difficult to accept all his reasonings, and very difficult to accept some, but undoubtedly he presents a good case for careful consideration, and it will not be easy, in the face of McDonagh's facts, for the champions of the view that the *spirochæta pallida* is the cause of syphilis to maintain their case. Moreover, the acceptance of the leucocytozoon syphilidis can well explain many problems which have hitherto remained unsolved.

For the first time, a rational explanation of the Wassermann's reaction is given, and if the author's explanation is correct, its use will be limited, and modify the way in which we have so far interpreted its results. There is a very important chapter on the chemotherapy of syphilis, which should be read by all who are interested in this subject. The chapters on the clinical aspect of syphilis are quite complete, and several new points have been brought forward relative to the way syphilis attacks the central nervous system. The chapters on *ulcus molle* and *gonorrhœa* contain useful and up-to-date information. The chapter on the subsidiary venereal diseases is instructive, and mention is made of various points which we believe have not before appeared in any English work.

The second part deals with the cells which take part in chronic inflammation and the relationship existing between chronic inflammation and malignant disease. The life history of all the cells are described in detail, and several interesting points are brought forward concerning the cause of malignant disease. The author has described the cells individually, as he finds that the gross histological changes to be met with in syphilis do not differ from those met with in most other forms of chronic inflammation. This procedure certainly makes histology less cumbersome, more intelligible and at the same time interesting.

The differentiation of embryonic activity and malignant disease is a new light which has been thrown upon the subject. A great feature of the book is the way in which the pathological work harmonizes with the clinical, and about a hundred cases are described from the author's own practice.

The book is beautifully illustrated, and deserves not only a wide

circulation, but very earnest consideration by students of this very fascinating speciality, as well as by the thinking man in general practice.

Amœbiasis and the Dysenteries. By LLEWELLYN POWELL PHILLIPS, M.D.
Pp. xi. + 147. London: H. K. Lewis & Co., Ltd. 6s. 6d. net.

"DYSENTERY" must now be regarded as a clinical term indicating a condition which may be set up by a number of agents ætiologically different. The disease is of immense importance, the deaths and invalidism resulting from it being perhaps greater than from any other single tropical disease. Moreover, great advances have of late been made in determining the nature and rôle of the various micro-organisms which are concerned in its causation and in the treatment of the condition.

In the book under review, Dr. Phillips has summarized all that is essential concerning the dysenteries. He deals with the subject under the following sub-divisions:—amœbiasis or dysentery caused by the amœba; ciliate dysentery, caused by the balantidium; flagellate dysentery caused by lamblia and other flagellates; bilharzial dysentery, and bacillary dysentery. Under each a description is given of the parasites and of recent work concerning them, and of the symptoms, complications, and treatment. The book concludes with a bibliography and index. Altogether, Dr. Phillips has given an excellent summary of the subject, and the book should be most useful to the tropical practitioner.

Tuberculosis: its Cause, Cure, and Prevention. By E. O. OTIS, M.D. Boston.
12mo. Pp. xviii. + 362, with 16 plates. New York: T. Y. Crowell & Co. \$1.25 net.

THIS little volume is the second edition of a book, published five years ago under the title *The Great White Plague*, and represents an attempt to present the simple facts of tuberculosis in a form that will be interesting and intelligible to laymen. The author is an optimist, holding that tuberculosis is steadily decreasing, and he believes that the campaign against it may be carried on with an assured hope of success in its prevention and ultimate eradication. The book is well written, not too full of mere facts, and designed so as to cover the whole ground. It is not free from a certain looseness of statement. Tuberculin, we read, is "a sort of serum or antitoxin made from the tubercle bacilli" (p. 55); the plural word cilia is given a kind of reduplicated plural form "ciliæ" (p. 64), for example. It contains a number of quotations from standard authorities on tuberculosis, and a number of useful rules for the layman who suffers from tuberculosis or wishes to avoid it. There is considerable demand at the present time for manuals of this type. There is no doubt that the book of Dr. Otis supplies a want, and may be cordially recommended to the public.

Leper Houses and Mediæval Hospitals. By CHARLES A. MERCIER, M.D.,
F.R.C.P. Pp. 47. London: H. K. Lewis & Co., Ltd. 1s. net.

As was to be expected the FitzPatrick Lectures on "Leper Houses and Mediæval Hospitals," by Dr. Mercier, were of unusual interest.

The first lecture, dealing with the early leper hospitals in Europe and the

restricted lives of the lepers, was from an historical point of view most instructive. The inclusion in it, however, of such statements as "it is very doubtful whether leprosy is contagious at all," and "the diminution of the disease in Europe has not been the result of the isolation of the lepers" seems not only unfortunate but, to our thinking, actually harmful; that they do not represent the generally accepted opinion is clearly demonstrated by the following resolutions passed by the leading leprologists at the Second International Conference on Leprosy, held in Bergen, 1909:—

- (1) Leprosy is a disease which is contagious from person to person.
- (2) In view of the success obtained in Germany, Iceland, Norway, Sweden, etc., it is desirable that other countries with leprosy shall proceed to isolate their lepers.

An original theory is advanced by the lecturer, namely, that leprosy in Europe has been replaced by tuberculosis, the bacillus of leprosy having changed in course of time into the tubercle bacillus. This hypothesis, though at first sight attractive, does not bear scrutiny, for the symptoms produced by the tubercle bacillus are totally different from those caused by the lepra bacillus, both in their naked eye appearances and their microscopical anatomy. The bacilli, though resembling one another morphologically, differ in the successful experimental inoculation of the tubercle bacilli on certain lower animals and the failure, up to the present, of all such experiments with the lepra bacilli.

The second lecture deals chiefly with mediæval hospitals, and will be of great value to all interested in this subject.

The Occupational Affections of the Skin. By R. PROSSER WHITE, M.D. Pp. 165. London: H. K. Lewis & Co., Ltd. 7s. 6d. net.

EVER since the passing of the Workmen's Compensation Act, the problems connected with injuries to the skin the result of exposure to irritants on working—the so called occupational or trade dermatites—have attracted special attention both from the legal and medical point of view. Consequently, a not inconsiderable literature has collected round the subject, but it has been so widely distributed in pamphlets and journals that information on any individual point usually entailed a prolonged search.

All this has been obviated by Dr. Prosser White's excellent brochure. In it he has collected a mass of useful knowledge on the occupational dermatites, which is well-arranged and carefully indexed.

The book may be read with interest and profit by any one, and will be indispensable to those who have to deal specially with this type of cutaneous affection.

Diet and Disease in Infancy. By H. C. CAMERON, M.D. London: J. and A. Churchill. 8s. 6d. net.

The Health of the Child. By O. HILDESHEIM, M.D. London: Methuen & Co. 1s. net.

What every Mother should know. By C. G. KERLEY, M.D. New York: Paul Hoeber. Price, \$0.35.

Of these three publications the most important and the most ambitious is Dr. Cameron's. It is a treatise written from the purely clinical point of

view, and represents the teaching of its distinguished author at the famous school of Guy's Hospital. It is, therefore, especially addressed to the medical student and practitioner, and so differs from the other two volumes which we have bracketed with it, which are directed more to the mother. Of Dr. Cameron's book we have nothing to say except by way of praise. It is eminently sound, practical, and complete, and the student who has obtained a fair mastery of its contents should be able to face with equanimity the perils and pitfalls of the dietetic treatment of the infant. We may add that it is particularly pleasant to find that the author insists on the fact, too often overlooked, that rickets is a general disease, and that the bony changes, so frequently considered to be the main and foremost signs of the disease, are in reality secondary changes due to the persistence of an illness previously ignored. It cannot be too often asserted that the bony changes need not occur, provided the student has learnt to recognize the disease in its earlier manifestations. There are some good plates and other diagrams and illustrations, and the volume is attractively produced.

The second of these books is a short treatise on the symptoms which require interference by the nurse, mother, or doctor, during infancy and childhood. It is prefaced by a short introduction from the pen of Dr. Still. It states its propositions clearly and concisely, avoiding controversial matters, and is a safe and simple guide to place in the hands of the mother.

Dr. Kerley's pamphlet is an even briefer statement of the same themes, produced in the first instance for a child's welfare society. The diets recommended are those in common use in the United States, and differ somewhat from those which would find acceptance in this country; but apart from this detail the pamphlet is fitted for circulation in England, the main principles being well outlined.

Syphilology and Venereal Disease. By C. F. MARSHALL, M.D., M.Sc., F.R.C.S. Third edition. Pp. 465. London: Baillière, Tindall and Cox. 10s. 6d. net.

THAT this book has reached its third edition clearly shows that a comprehensive work on venereal diseases in the English language was wanted. Having had the opportunity of reviewing the other two editions, the first of which appeared in 1906, we are struck by the slight variation in them, in spite of the enormous amount of new and important work which has been done since that time. It is a pity that what illustrations there were have been removed, for no medical subject calls more for them, and a few pictures of chancres can produce a better mental impression than chapters of print. The book still remains a clinical treatise, but we think its value would have been very much enhanced if the clinical material had been based upon the author's experience, instead of being in the main culled from other writers. As a general résumé of current opinion upon venereal diseases the book is extremely useful, especially as many references are given at the end of each chapter. Those who wish to acquire a general knowledge of syphilis and gonorrhœa should read the book, and we would suggest, in order to make it more generally useful to the general practitioner, that in a future edition more details

should be given regarding the treatment.

The Intensive Treatment of Syphilis and Locomotor Ataxia by Aachen Methods. By REGINALD HAYES, M.R.C.S. Pp. 63. London: Baillière, Tindall and Cox. 3s. 6d. net.

THIS book contains a very readable account of the treatment of syphilis by inunction, and many illustrative cases are reported out of the author's practice. The book contains nothing new, but nevertheless, many points are brought out in a single volume like this, which would be hidden, or would run the chance of being neglected, in a comprehensive book on syphilis. Although salvarsan has rendered inunctions of mercury superfluous in many cases, certainly, neither that drug nor the intrathecal injections of salvarsanized serum have detracted much from the value of inunction in certain cases of nervous syphilis. As the author rightly shows, there are some forms of syphilitic disease of the nervous system in which inunction is the best treatment. The book is valuable also in showing that the Aachen treatment can be successfully carried out away from one of the most objectionable and over-rated places in the world. Fortunately, none of our patients can visit Aachen now, and it is to be hoped that no medical man will ever send them there again.

Physiological Principles in Treatment. By W. LANGDON BROWN, M.A., M.D., F.R.C.P. Crown octavo. Pp. 408. Third edition. London: Baillière, Tindall and Cox. Price 5s.

THE third edition of this book is in many respects very different from the first. Much of the matter has been altered, not only in arrangement, but also in substance, and there are two additional chapters. The changes show that the author keeps himself, and is determined to keep his readers, well abreast of modern teaching and latter-day research. To say that he succeeds in doing this, while scrupulously avoiding all irritating technicalities, and writing down to the level of those who have forgotten the appearance of a pith frog, is to pay a tribute not only to Dr. Langdon Brown's wide and easy grasp of his subject, but also to his imagination. Every honest practitioner hates the physiologist with grim hatred, for it is the business of the latter to impose upon the former fresh intellectual burdens which he can ill-afford to bear. Dr. Langdon Brown plays the part of the good Samaritan; he lightens these burdens, and occasionally succeeds in rendering the altogether hateful more than half attractive. It is not surprising that the book has been successful. It is well written; its exposition is clear, its reasoning lucid, its arrangement good. Its size is handy, its print presbyopic, and its index admirable. When Dr. Langdon Brown set out to write the book, he evidently aspired to produce a key to physiological scripture suited to the senile, the sceptic, and the student. It is not given to many to succeed in realizing that ambition in so full a measure as he has done. The third edition will certainly not be the last.



Preparations, Inventions, etc.

A NEW CONDENSER TREATMENT APPARATUS.

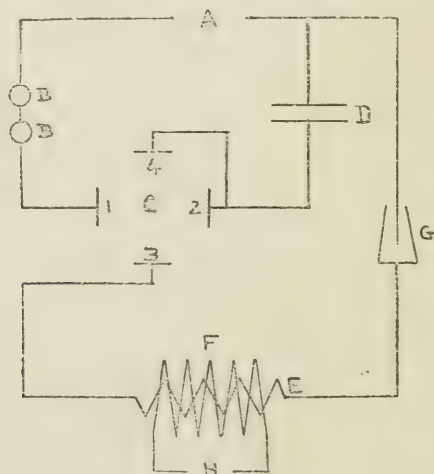
(Designed by the late Dr. Lewis Jones.)

Dr. Lullum Wood Bathurst (late Chief Assistant, Electrical Department, St. Bartholomew's Hospital) writes:—The discharge of a condenser can be used either for muscle testing or for treatment. In the former case, isolated discharges of even strength from the condenser are used; in the latter, it is necessary to have discharges in large quantity, and increasing and decreasing regularly in intensity. A mechanical device is, therefore, necessary, which will connect the condenser to the main in one moment, and discharge it through the patient in the next. At no moment, however, must the patient be connected directly to the main.

Dr. Lewis Jones made use of a four contact turbine jet interrupter, as used in X-Ray work, and connected the apparatus up as shown in the diagram (for which I am indebted to Mr. C. Schall).

"C" is the interrupter, in which a drum revolves in such a way that in one moment the contacts 1 and 2 are connected, 3 and 4 being disconnected, whereas in the next moment 3 and 4 are connected and 1 and 2 disconnected.

Taking first the case when 1 and 2 are connected, we see from the diagram that current flows from the main terminal "A" through the



resistance lamps "B B" to the contact 1 in the interrupter "C". Thence it flows through the drum to 2 and to the condenser "D", which is thereby charged up. From the condenser "D" the current flows back to the other main terminal "A".

When the drum in the interrupter has rotated till 3 and 4 are con-

nected the charge in the condenser flows away through the varying resistance "G" (Dr. Lewis Jones's Rhythmical Interrupter), through the primary coil "E" to the contact 3, and through the drum and contact 4 back to the condenser "D".

Whilst flowing through the primary "E" it induces another current in the secondary "F", and this then flows through the patient "H".

The variable interrupter "G" consists of a glass cup containing water. A wire is moved in and out of this by a motor, and so the resistance in circuit is varied regularly. This then varies the primary current, and so the secondary current in its turn increases and decreases regularly.

The maximum of the secondary current is controlled by moving the secondary coil more or less over the primary.

It may be convenient to have two or more coils on one board so that different portions of the body may be treated simultaneously.

It will be found that this form of electrical stimulation has great advantages over the ordinary faradic or sinusoidal currents even when the latter are applied with rhythmic variations. The sensation of the current thus obtained is far more pleasant than other forms, being well tolerated even by children, and my experience with it in various forms of paresis and some neuroses is very encouraging.

"FROST-BITE" IN THE TRENCHES.

Dr. C. R. Rutland, of 83A, Chester Square, S.W., writes:—It is generally admitted that this condition, which proved so serious a source of suffering and loss amongst our troops last winter, was due to the defective leg-wear provided by the authorities.

The puttee, which is in many respects an admirable covering, being warm, elastic, fairly permeable, and a good protective against cold, damp, thorns, branches and dense undergrowth, has the fatal defect due to the means of fastening, which consists of a long inelastic tape which must be wound tightly round the leg just below the knee, thus interfering with the blood circulation, especially when the material shrinks under the influence of moisture, inevitable in the trenches in winter.

Early in the spring of the present year, I devised a very simple "hook-pin" (a fastening free from the defects of the tape) and submitted it to the Editor of the *B.M.J.*, who wrote in the issue of June 12th: "It appears not only completely to answer the purpose in respect of puttees, but is likely also to replace the safety-pin for fixing bandages."

If this device is to prove of real value to our troops and to our wounded soldiers in the hospitals, it is essential that it should be tested as widely and thoroughly as possible and at once.

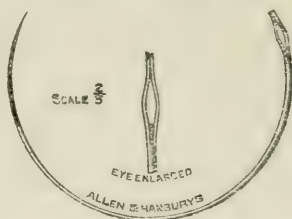
I have had a number of these hook-pins made, and will gladly send a specimen to any wearer of puttees, or to any nurse or surgeon, or to anyone interested who has a friend acting in either capacity.

IMPROVED NEEDLE FOR MUSCLE AND FASCIA.

(London: Messrs. Allen and Hanburys, Ltd., 48, Wigmore Street,
Cavendish Square, W.)

Dr. Hamilton Whiteford, of Plymouth, has been using for some time

past a needle of improved form for stitching muscle and fascia, which he has found most useful. It is a $4\frac{1}{2}$ -inch needle, round bodied, with a



Paterson eye, and a Moynihan $\frac{5}{8}$ circle curve. There are two sizes, the stouter being more suitable for general work. The needle is used without a holder, and though it looks, perhaps, slightly clumsy, it is not so in actual use.

SERA AND SUSPENSIONS FOR AGGLUTINATION TESTS.

(London: Messrs. Burroughs, Wellcome & Co., Snow Hill Buildings, E.C.)

The method of serological diagnosis, now so largely and so increasingly in use, can be applied in two different ways. The patient's serum can be tested against a known micro-organism, as in the well-known Widal's test for typhoid fever. The position can, however, be reversed when it is required to identify an organism isolated from the patient's blood in the first few days of his febrile attack, or from the urine or faeces some days later; in such case, the unknown organism is tested with a serum of known agglutinating properties.

For the first, the Widal, class thoroughly reliable suspensions of the various organisms are required; for the second, stable sera obtained with proper precautions from animals injected with pure strains of known organisms are necessary.

The range of these serological diagnostic products issued from the Wellcome Physiological Research Laboratories now include the following:—*V. cholerae*, *B. dysenteriae* (Shiga), *B. dysenteriae* (Flexner), *B. enteritidis* (Gaertner), *M. melitensis*, *B. paratyphosus* A, *B. paratyphosus* B, *B. typhosus*.

These products, both sera and suspensions, are issued in bottles of 1 c.c. and 10 c.c.



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